



Aalto University
School of Business

TARP'S EFFECT ON BANKS' REPORTED PERFORMANCE

An empirical study on TARP contributions'
relative sizes' effect on bank performance

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Abstract

The financial crisis that began in August 2007 has been the most significant challenge to the banking industry and financial system as a whole in the U.S. since the great recession in the 1930s. It is one of the most studied series of events in the modern economic research. Government intervention is a controversial measure taken to mitigate the widespread negative effects resultant from a banking crisis.

This thesis studies the U.S. Treasury's Troubled Asset Relief Program's ("TARP") effect on the banks' performance by the means of a review of earlier literature on the subject and by conducting an empirical study. The empirical study uses accounting-based profitability and balance sheet based indicators in determining the performance of the banks. Three regression models are estimated in the empirical study. The models are formulated to answer the research question "Were the TARP funds allocated optimally and fairly among the U.S. banking industry's entities?" by studying the TARP funds' size's – relative to the recipients' total assets – effect on the banks' performance one year after the TARP capital injections.

Earlier literature has found that TARP e.g. worsened the operating efficiency of the banks participating in it, but allowed competitive advantages, and an increase in market share and market power for its recipients. Earlier literature has also concluded that TARP induced moral hazard among banks.

The results of the empirical study conducted in this thesis suggest that the relative size of received TARP funds has had an effect on the banks' performance one year after the TARP injections. The relative size of received TARP funds has had a clear positive effect on return on loans. However, the effect on other performance indicators is mixed. The profitability indicators subject to the most managerial discretion in terms of result management have been affected negatively by the relative size of received TARP funds, which could indicate that the receipt of a large TARP injection has encouraged managers to unravel already accumulated writedown backlogs. The results of the empirical study also find that banks' prior performance has had an effect on the banks' probability to receive TARP funds: more poorly performing banks were more likely to receive TARP funds.

The possibility of the TARP funds affecting the bank managers' usage of discretionary items opens an interesting possibility for accounting research to further study the phenomenon. The results of this study call for research on the usage of discretionary items before, during, and after TARP in U.S. banks, and the relative TARP funds' size's effect on these.

Keywords financial crisis, CPP, TARP, banks

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Tiivistelmä

Vuoden 2007 elokuussa alkanut finanssikriisi on ollut merkittävin haaste yhdysvaltalaiselle pankkialalle ja koko rahoitusjärjestelmälle 1930-luvun Suuren laman jälkeisessä historiassa. Finanssikriisi on yksi modernin taloustieteen tutkituimmista tapahtumasarjoista. Valtion rahoittamat apuohjelmat ovat kiistanalainen keino, jolla pyritään lieventämään pankkikriisien merkittäviä negatiivisia vaikutuksia kokonaistalouteen.

Tämä tutkielma tutkii Yhdysvaltain valtionvarainministeriön (U.S. Treasury) Troubled Asset Relief Program ("TARP") -rahoitusapuohjelman vaikutusta pankkien suorituskyykyyn tutkimalla aikaisempaa kirjallisuutta, sekä empiirisellä tutkimuksella. TARP-ohjelman vaikutusta pankkeihin tutkitaan raportoituuihin talouslukuihin perustuvilla, kannattavuutta ja taseen koostumusta mittaavilla indikaattoreilla mitattuna.

Tutkielman empiirisessä osiossa käytetyt regressiomallit on luotu vastaamaan tutkimuskysymykseen "Allokoitiinko TARP-ohjelman yhteydessä sijoitetut optimaalisesti ja reilusti yhdysvaltalaisen pankkialan toimijoiden kesken?" tutkimalla TARP-ohjelman yhteydessä sijoitettujen varojen vastaanottajan kokoon suhteutetun määrän vaikutusta pankkien suorituskyykyyn vuosi TARP-sijoitusten jälkeen.

Aikaisemmat tutkimukset ovat muun muassa todenneet, että TARP-ohjelma heikensi pankkien operatiivista tehokkuutta, mutta samanaikaisesti nosti TARP-sijoituksia vastaanottaneiden pankkien markkinaosuuksia sekä markkinavoimaa ja antoi näille kilpailuetua. Aikaisempien tutkimusten mukaan TARP-ohjelma myös loi moraalikatoa pankkien keskuudessa.

Tämän tutkielman empiirisen tutkimuksen tulokset näyttävät TARP-ohjelman yhteydessä sijoitettujen pääomien suhteellisen koon vaikuttaneen vastaanottavien pankkien suorituskyykyyn vuosi TARP-sijoitusten jälkeen. TARP-sijoituksen suhteellisella koolla on ollut selvä positiivinen vaikutus lainojen tuottavuusasteeseen. TARP-sijoituksen suhteellisen koon vaikutus muiden kannattavuusindikaattoreiden kehitykseen on ollut vaihteleva. Eniten johdon tulosoheijaukselle alttiit kannattavuusindikaattorit ovat reagoineet negatiivisimmin TARP-sijoitusten suhteelliseen kokoon, joka voi tarkoittaa sitä, että suuren TARP-sijoituksen vastaanottaminen on saanut vastaanottajapankkien johtajat purkamaan huonon taloudellisen jakson aikana kertynyttä alaskirjaustarvetta. Tämän tutkielman tulokset osoittavat myös, että pankkien TARP-ohjelmaa edeltävä suorituskyyky on vaikuttanut todennäköisyyteen vastaanottaa TARP-sijoituksia: heikompikuntoiset pankit saivat todennäköisemmin TARP-sijoituksia.

Mahdollinen TARP-sijoituksen vaikutus vastaanottajapankkien johtajien harkinnanvaraisten erien käyttöön avaa mielenkiintoisen mahdollisuuden laskentatoimen tutkimukselle kyseisen ilmiön edelleen tutkimiseen. Tämän tutkielman tulokset johdattelevat tulevaa tutkimusta selvittämään harkinnanvaraisten erien käyttöä ennen TARP-ohjelmaa, sen aikana ja sen jälkeen, sekä TARP-sijoitusten suhteellisten kokojen vaikutusta harkinnanvaraisten erien käyttöön.

Avainsanat finanssikriisi, CPP, TARP, pankit

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1. INTRODUCTION

This section provides the background for the studied phenomenon and sets out the motivation for studying the Troubled Asset Relief Program's and specifically Capital Purchase Program's and Targeted Investment Program's effect on banks' performance. This section also lays out the research questions for the literature review and empirical study of this thesis, and briefly discusses this thesis' contribution to the research of the subject. The structure of this thesis is described in chapter 1.3 of this section.

1.1.BACKGROUND AND MOTIVATION

The financial crisis that began in August 2007 has been the most significant challenge to the banking industry and financial system as a whole in the U.S. since the great recession in the 1930s (Calomiris & Khan 2015; Hoshi & Kashyap 2010). It is one of the most studied series of events in the modern economic research. In October 3rd, 2008, the United States Congress accepted a proposal by the U.S. Department of the Treasury (the "Treasury") regarding a program under which the U.S. government invested over \$204 billion into 707 troubled banking industry companies during 2008 and 2009 (Hoshi & Kashyap 2010; U.S. Department of the Treasury 2016a). This program is the Capital Purchase Program ("CPP"), which was created under the Troubled Asset Relief Program ("TARP"), which, in turn, was created as part of the Emergency Economic Stabilization Act (U.S. Department of the Treasury 2010). The investments made under the CPP continued from the first investment into eight very large banks on 28th of October, 2008 until 29th of December, 2009 (U.S. Department of the Treasury 2016a). The TARP was initially approved to invest a total of \$700 billion into distressed assets of which the CPP's share was \$250 billion (Veronesi & Zingales 2010; U.S. Department of the Treasury 2010).

CPP funds were applied for by submitting a two-page form to each financial institution's primary banking regulator: The Federal Deposit Insurance Corporation, the Federal Reserve, the Office of the Comptroller of the Currency, or the Office of Thrift Supervision. The applications were reviewed using the "Camels" rating system, which evaluates six indicators: Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity to market risk. The successful applicants issued preferred stock for the Treasury. The preferred stock had to pay quarterly dividends yielding 5 % annually for the first five years and 9 % thereafter. The

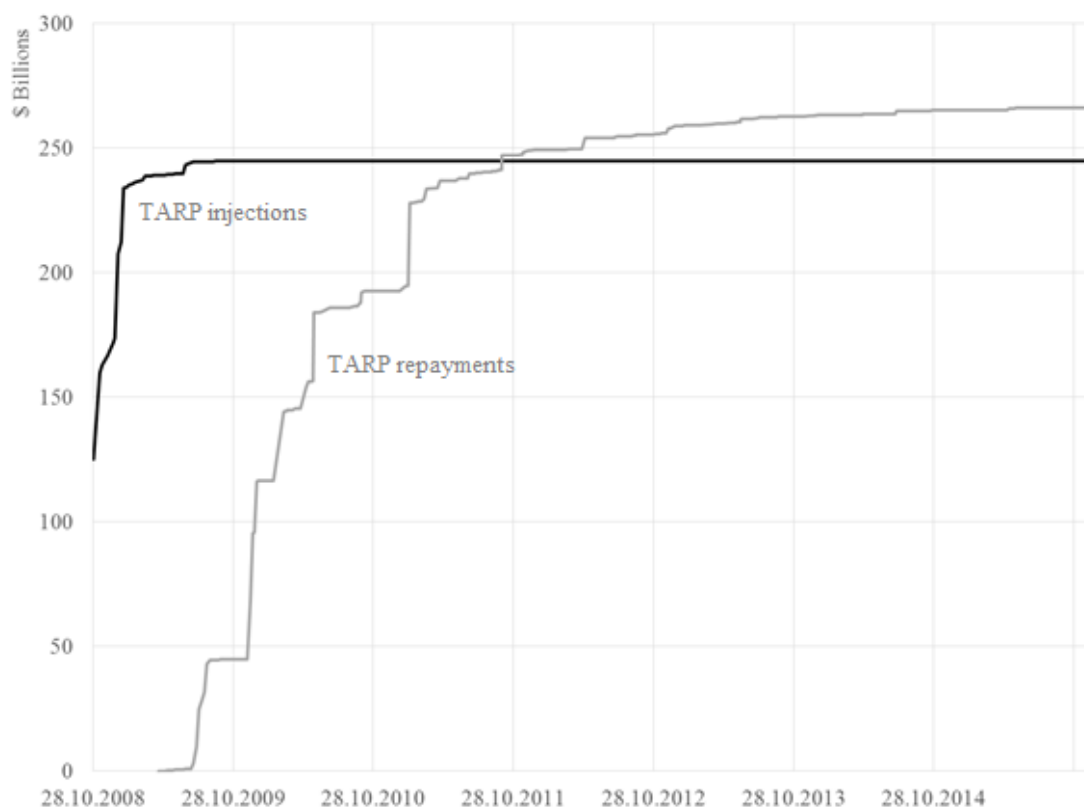
amount invested was at the discretion of the Treasury, but always 1–3 % of the investee’s risk-weighted assets or \$25 billion at maximum. If the investee was a public company, the Treasury required ten-year warrants for the company’s common stock. (Duchin & Sosyura 2014.)

On October 28th, 2008, just over a month after the bankruptcy of Lehman Brothers, the first investments under the CPP were made by the Treasury. Out of the \$250 billion initially allocated for CPP, some \$205 billion were ultimately invested in 707 financial institutions. (U.S. Department of the Treasury 2016b.) In addition to CPP, the Treasury created a complementary program, the Targeted Investment Program (“TIP”), which comprised two investments of \$20 billion each to Citigroup Inc. and Bank of America in December 2008 and January 2009, respectively (Calomiris & Khan 2015). The TIP investments brought the total amount invested under the programs to approximately \$245 billion.

The recipients of largest amounts of CPP and TIP investments combined were Citigroup Inc. (\$45 billion), Bank of America (\$45 billion), JPMorgan Chase & Co., and Wells Fargo & Co., with \$25 billion each. In total, nine financial institutions received more than \$5 billion per company and 27 more than \$1 billion, respectively (U.S. Department of the Treasury 2016b; Calomiris & Khan 2015.) On 27.1.2016, the banks that had received TARP funds had repaid approximately \$266 billion to the Treasury, while approximately \$258 million of the original investments was outstanding (U.S. Department of the Treasury, 2016b). The investments and repayments under TARP are shown in Figure 1 below.

FIGURE 1. CAPITAL INJECTIONS AND REPAYMENTS UNDER TARP

The figure below presents the capital injections made by the Treasury under TARP and the repayments made by the funded banks on a timeline between 28.10.2008 and 27.1.2016. The figures include combined data for CPP and TIP (U.S. Department of the Treasury 2016b). The total investment under TARP (only CPP and TIP) by the Treasury was approximately \$245 billion. The banks that had received TARP funds have repaid approximately \$266 billion to the Treasury.



TARP was directed towards financial institutions including bank holding companies (“BHC”), commercial banks, savings and loan institutions and other thrifts, and under 8 % of the TARP fund recipients were savings and loan institutions or other thrifts (Berger & Roman 2015). A timeline of the events around the TARP programs is presented in Table 1 below. This thesis studies the effect on CPP and TIP (hereafter together referred to as “TARP”) on BHCs and commercial banks, which are together referred to as banks. The exclusion of savings and loan institutions and other thrifts is due to their financial information not being fully compatible with banks and due to the fact that they compete in different ways than banks (Berger & Roman 2015). These exclusions are in line with earlier studies conducted by e.g. Harris et al. (2013), Cornett et al. (2013), and Berger & Roman (2015).

TABLE 1. TIMELINE OF EVENTS RELATED TO TARP CAPITAL INFUSIONS (BAYAZITOVA & SHIVDASANI 2012)

The table below presents a timeline of the events around the TARP capital injections in 2008–2009.

October 3, 2008: President Bush signs into law the Emergency Economic Stabilization Act of 2008, which establishes the \$700 billion Troubled Asset Relief Program (TARP).

October 13, 2008: U.S. Treasury interim assistant secretary Neel Kashkari announces a standardized program to purchase equity in a broad array of financial institutions.

October 14, 2008: The U.S. Treasury announces the Capital Purchase Program (CPP), which allows U.S. financial institutions to apply for a preferred stock investment by the U.S. Treasury. Nine large financial organizations announce they will subscribe to the facility in an aggregate amount of \$125 billion. The FDIC creates a new Temporary Liquidity Guarantee Program to guarantee the senior debt of all FDIC-insured institutions as well as deposits through June 30, 2009.

November 14, 2008: The deadline for publicly held financial institutions to apply for a CPP preferred stock investment by the U.S. Treasury.

February 4, 2009: The U.S. Treasury modifies restrictions on executive compensation for TARP participants. The total annual compensation for senior executive officers is limited to \$500,000, except for long-term restricted stock awards. Golden parachutes are prohibited for the top ten senior executives, and the next twenty-five executives are prohibited from receiving golden parachute payments greater than one year's compensation upon severance. Bonus claw-back provisions were extended from the top five executives to the next twenty-five executives.

February 10, 2009: U.S. Treasury Secretary Timothy Geithner announces the Financial Stability Plan involving forward-looking loss assessments for nineteen U.S. banks with assets exceeding \$100 billion, the Capital Assessment Program (CAP) whereby the U.S. Treasury will purchase preferred stock convertible to common equity in eligible banks, the creation of a Public-Private Investment Fund to acquire troubled loans and assets from financial institutions, expansion of the Federal Reserve's Term Asset-Backed Securities Loan Facility (TALF), and new initiatives to stem residential mortgage foreclosures and to support small business lending.

February 17, 2009: President Obama signs into law the American Recovery and Reinvestment Act of 2009, which includes a variety of spending measures and tax cuts intended to promote economic recovery. The act includes most of the executive compensation restrictions for TARP participants announced on February 4, 2009. The act includes additional compensation restrictions for TARP participants with a prohibition on bonuses, retention awards, or incentive compensation exclusive of long-term restricted stock awards that do not exceed one-third of the annual compensation.

February 23, 2009: The U.S. Treasury and federal bank regulatory agencies issue a joint statement in which they reiterate that under CAP, capital will be provided in the form of mandatorily convertible preferred stocks, and previous capital injections under CPP will also be eligible to be exchanged for these shares.

February 24, 2009: Federal Reserve chairman Ben Bernanke clarifies to Congress that the bank stress tests are not a precursor to nationalization of banks.

February 25, 2009: The U.S. Treasury publishes a white paper, term sheet, and FAQs containing details on the CAP program.

February 26, 2009: Iberiabank Corp. files notice with the Treasury Department that it will redeem all 90,000 outstanding shares of U.S. Treasury preferred stock for a redemption price of \$90.6 million.

March 19, 2009: The U.S. Congress proposes and passes H.R. 1586 in under twenty-four hours with an overwhelming margin. The bill imposes a punitive excise tax of 90% on all employee bonus payments made, retroactive to January 1, 2009, by institutions that have received \$5 billion or more in TARP capital.

March 31, 2009: Four bank holding companies (Marin Bancorp., Iberiabank Corp., Old National Bancorp., and Signature Bank) announce that they have redeemed all of the preferred shares issued to the U.S. Treasury under CPP.

April 24, 2009: The Federal Reserve Board publishes a white paper describing the process and methodology employed by federal banking supervisory authorities in their forward-looking assessment (stress test) of large U.S. bank holding companies.

TABLE 1. CONTINUED

May 6, 2009: The Wall Street Journal reports that results of the government's stress tests for several banks have been leaked to the media. It reports that American Express, Bank of New York Mellon, Capital One Financial, Goldman Sachs, MetLife, and JPMorgan Chase will not need to raise additional capital, while Bank of America needs \$34 billion, Wells Fargo requires \$15 billion, and GMAC needs \$11.5 billion. The Journal reports that Citigroup, State Street, Morgan Stanley, and Regions Financial will also need additional capital.

May 7, 2009: The Federal Reserve releases the results of the Supervisory Capital Assessment Program (SCAP) for the nineteen largest U.S. bank holding companies. The assessment finds that ten firms need to add \$185 billion to capital but that transactions and revenues since the end of 2008 have reduced the capital shortfall to \$75 billion. Banks that need to augment capital will be required to develop a detailed plan to be approved by its primary supervisor within thirty days and to raise the additional capital by November 2009.

June 10, 2009: The U.S. Treasury Department issues detailed rules regarding the limitations on executive and employee compensation imposed under the American Recovery and Reinvestment Act of 2009 for companies receiving funds under TARP. Treasury secretary Timothy Geithner also issues a press release on compensation principles.

December 31, 2009: The authority of the U.S. Treasury to purchase capital in financial institutions under CPP terminates, as specified in the Emergency Economic Stabilization Act of 2008.

Implementing such an enormous-scale government-funded program is always a major decision affecting the global economic history. The use of taxpayer money on the revitalization of the financial sector is a sensitive topic as it is highly costly to taxpayers (Granja 2013), and it has been proven to cause a moral hazard as the banks receiving a “too-big-to-fail” status are incentivized to allocate their capital towards more risky uses (O'Hara & Shaw 1990; Hoque 2013; Harris et al. 2013). Due to the aforementioned factors, the optimal and fair allocation of such government funds is highly important.

1.2. RESEARCH QUESTION AND CONTRIBUTION

Unintended effects of government guarantees on different entities' incentives have been systematically studied since the 1970s by e.g. Ehrenberg & Oaxaca (1976) and Mortensen (1977), who studied the subject of unemployment insurances' effect on employees' employment decisions (Duchin & Sosyura 2014). Prior research (e.g. Ding et al. 2013) has covered the topic of government intervention's effect on banks' reported performance in geographies other than the United States. Government intervention's, including the CPP's, effect on banks' stock performance and financial results has been studied in the U.S. as well (e.g. Berger & Roman 2015; Farruggio et al. 2013; Harris et al. 2013; Liu et al. 2013). The previous research has, however, only studied the phenomenon by labeling the banks that received any CPP/TARP funds as “TARP banks” and others as “non-TARP banks”. This thesis's approach complements the prior research by widening the research basis comprising

logistic regression studies by taking into account the relative size of the TARP contribution per bank.

The research question of this thesis is:

Were the TARP funds allocated optimally and fairly among the U.S. banking industry's entities?

The research question is answered through a literature review studying government intervention's and TARP's effect on bank performance, and by conducting an empirical study analyzing the effects of relative TARP injections' sizes on the banks' performance. If the TARP funds have been allocated optimally and fairly, there should not be an observable effect on the banks' performance compared to one another resultant from the relative size of received TARP funds. If the banks receiving larger amounts of TARP funds in relation to their total assets have systematically outperformed other banks one year after the capital injections, the funds have been unjustly allocated. This is due to the fact that the TARP funds' target was to remedy troubled financial institutions, and if these troubled institutions have been systematically brought to a superior performance level through subsidy-like government capital, the funds have not been allocated optimally from the overall economy's viewpoint. This type of government capital injections would potentially further invoke hazardous behavior from the banks as the banks that had assumed the most risk in the past would be rewarded for realized risk in this scenario. The research question, being of highly fundamental nature, cannot be answered through this thesis alone. This thesis seeks to contribute to the already vast literature answering the research question and to provide a basis and guidance for further research contributing to answering the research question.

1.3.STRUCTURE

This thesis uses two main methods to study the effect the relative size of received TARP funds has had on the U.S. banks' performance: a literature review to provide adequate background, and an empirical study. The literature review is conducted in the second and third chapters of this thesis. The first literature review section discusses bank performance measurement methods. The third chapter begins with a section studying government intervention's effect on bank performance in general, globally. Thereafter, TARP's effect on performance is studied through literature review.

The fourth chapter of this thesis presents the research design of the empirical study. The fourth chapter includes sections describing the hypotheses, data used, variables formed, and the three regression models formulated based on the data and variables. The fifth chapter then presents the results of the regression models including separate sections for descriptive statistics, studies of correlations, and for each of the models' results. The sixth and last chapter of this thesis draws the conclusions from the literature review and empirical study conducted, and suggests topics for further research on the subject of TARP's effect on bank performance.

2. MEASURING BANK PERFORMANCE

Banks report their profit and loss statements and balance sheets in a different manner to normal companies, due to which the performance measurements of banks are different than those of normal companies. In order to provide basis for this thesis' subject of analyzing TARP's effect on bank performance, this section provides a brief review of bank performance measurement. Bank profitability and balance sheet measures are addressed, after which a brief introduction of bank efficiency is provided.

2.1. BANK PERFORMANCE IN GENERAL

The primary objective of any financial system is to provide information for investors regarding the reporting entities for the use of investors, and in this sense the financial reporting of banks is no different to other entities (Bushman 2014). However, banks are in many respects different to companies competing in other industries and have a set of characteristics that are unique to the financial sector (Bushman 2014). Due to this, banks' financial reports differ materially from those of non-financial entities. Even though performance measurement usually varies between all different industries, banks' performance measurement has an unusually high amount of dissimilarities with other industries due to the industry-specific financial reporting.

Bank performance is often measured by market information, i.e. stock prices (see e.g. (Fahlenbrach et al. 2012) due to the stock prices theoretically fully reflecting all publicly available information as they unbiasedly react to information in real time (Ball, Ray; Brown 1968). Therefore, stock prices do not only contain information on the banks fundamentals, but also on expected government actions (Bond & Goldstein 2015). However, attempting to contribute to the accounting literature in bank performance research, this thesis focuses on bank performance measured by accounting-based information in order to measure the actual realized financial performance of the banks after the receipt of TARP funds.

2.2. BANK PROFITABILITY INDICATORS

A bank's income statement differs from a regular company's income statement. It is typically divided into four components: net interest income, provision for loan losses, net non-interest income, and securities gains and losses (Beatty & Liao 2014). The regulation concerning result

planning is stricter for banks than for ordinary companies and therefore e.g. return on assets (net income after taxes as a percent of total assets) and return on loans (interest and fees on loans as a percent of total loans and leases) are the most fundamental accounting-based measures of profitability for banks. Return on assets is used as the main accounting-based measure of bank profitability by e.g. Blackwell et al. (1994), Hryckiewicz (2014), Lin & Zhang (2009), and Ding et al. (2013). Return on loans is used as one of the core indicators of bank profitability by e.g. Cornett et al. (2013) and Logue & Rivoli (1992).

2.3.BANK BALANCE SHEET INDICATORS

In addition to measuring profitability, accounting-based information can be used to measure e.g. liquidity, solvency, and other balance sheet based performance indicators. Banks' balance sheets are also reported on a format different than ordinary companies' balance sheets. The most used balance sheet based bank performance measures include tier I common equity ratio (used by e.g. Harris et al. 2013, Cornett et al. 2013, Li 2013, and Fahlenbrach et al. 2012) which is an indicator specific to banks and measures the amount of tier I common equity as regulated by Basel Committee on Banking Supervision (2011) in relation to the banks total assets. Liquidity ratio (used by e.g. Granja 2013, Cornett et al. 2013, and Hryckiewicz 2014) is a highly used bank balance sheet indicator, which measures the cash and investment securities as a percentage of total assets. Different nonperforming loan ratios (used by e.g. Lin & Zhang 2009, Nakashima 2016, and Farruggio et al. 2013) are frequently used measures, which include a component formed by summing loans and leases that are 90 or more days due, nonaccruing loans and leases, and other real estate owned, which is then divided by e.g. total loans and leases. Another frequently used balance sheet based bank performance indicator is core deposits to total assets (used by e.g. Beatty & Liao 2014, Cornett et al. 2013, and James 1991), which measures the sum of transactions deposits and non-transaction deposits of under \$100 000 as a percentage of total assets.

In addition to the aforementioned balance sheet indicators, bank balance sheet information is used as a measure of the banks' risk-taking (Black & Hazelwood 2013). Riskiness of an asset is also one of the factors influencing the asset's performance, as a higher performance is required of a more risky asset (Sharpe 1966) and thus a lower risk enhances the risk-adjusted performance of an asset, here a bank. Bank risk can be measured by the aforementioned balance sheet based indicators. In addition, e.g. expected delayed loan loss provisions, which is derived

from bank balance sheet information, can be used to measure bank risk (Bushman & Williams 2015).

2.4. BANK EFFICIENCY

In addition to profitability and balance sheet structure indicators, the banking industry is evaluated on the basis of its actors' efficiency. This thesis does not concentrate on bank efficiency, but the topic is briefly discussed in order to provide a more comprehensive context for bank performance measurement. Efficiency as it is meant in the banking literature is an indicator specific to the banking industry. Bank efficiency is measured as the relative efficiency score's distance from the efficient frontier first introduced by Markowitz (1952) (Bonin et al. 2005).

Assessing the efficiency of banks has been a core topic of the research relating to bank performance for decades. The main factor causing controversy in the research field is the appropriate inputs and outputs of the banks' production process. Even though wide consensus regarding the measurement of bank efficiency does not exist, it is most commonly accepted that the main inputs are fixed assets and employees. (Holod & Lewis 2011.)

2.5. BANK PERFORMANCE FROM REGULATORS' VIEWPOINT

The fact that the recent financial crisis resulted in a need for government bailouts of banks brought more into discussions the concerns regarding proper monitoring of banks' risk taking incentives, which led to demands for additional equity capital to be held by banks. In fact, one of the most central of the items regulated in Basel III is tier I common equity. (Beatty & Liao 2014.) This is one of the key indicators of riskiness of a bank's assets, which is arguably the most pressing fundament the regulators are concerned with. For example Barth & Landsman (2010), Nakashima (2016), and Akins et al. (2016) use riskiness of bank assets as one of the key performance indicators.

The capital requirements are also in the core of the most central regulatory bank performance indicator regarding the U.S. banks in the wake of TARP, i.e. the CAMELS rating system. This system was used to evaluate the TARP applicants. CAMELS stands for Capital adequacy, Asset quality, Management, Earnings, Liquidity, and Sensitivity to market risk. For example Duchin

& Sosyura (2014) assess bank performance through estimating CAMELS proxies for their sample. They use tier I common equity ratio as Capital adequacy, the negative of noncurrent loans and leases as a percentage of total loans and leases as Asset quality, negative of the number of corrective actions taken against executives by regulators as Management quality, ROE as Earnings, cash divided by deposits as Liquidity, and ratio of absolute difference between short-term assets and short-term liabilities to earning assets as Sensitivity to market risk. Fairly dissimilar proxies have also been used, as e.g. Beatty & Liao (2011) and Bushman & Williams (2015) use ROA as a proxy for Management.

One measure for bank performance from the overall economy's viewpoint is their ability to borrow and lend. For example Calomiris & Khan (2015) and Li (2013) use different measures of lending activity as bank performance indicators in their studies. Calomiris & Khan (2015) use the supply of lending as a performance indicator in their study of TARP banks. Likewise, Li (2013) uses the credit supply measured by all types of loans and the level of new loans issued as bank performance indicators in his study.

3. GOVERNMENT INTERVENTION IN THE BANKING INDUSTRY

This section compiles the earlier literature on the subject of government intervention's and TARP's effect on banks' performance. This section does not purport to include a review of all relevant studies published on the subject, but seeks to review the most relevant parts of the studies concentrated on the phenomenon in question. First, this section reviews earlier literature on different types of government interventions' effect on bank performance in general, and second, studies on TARP's effect on bank performance are reviewed.

This thesis focuses only on the government intervention conducted in the form of government-led programs that have subsidy-like components, i.e. the so called "bailout programs". It can sometimes be disputable whether a certain intervention measure is in fact a "bailout", but the clearest intervention forms that do not provide the banks any subsidy-like compensation is excluded from the scope of this thesis. An example of this type of government intervention is intervention in the form of pure regulation including no compensation components.

3.1. GOVERNMENT INTERVENTION'S EFFECT ON BANK PERFORMANCE

Government intervention's forms and weight have been actively discussed by scholars since the early 1900s (Barth et al. 2004). Systemic banking crises have induced formidable pressure on national governments to take interfering action. The actions taken, in turn, have raised questions regarding the long term effects they will have in the behavior of the banking sector (Hryckiewicz 2014.)

In the banking industry in particular, the phenomenon behind the term "too big to fail" has become one of the most discussed topics in the 2010s. The term was formally introduced in September 1984, when the Comptroller of the Currency stated to the Congress that some banks were simply "too big to fail" and announced admittance of total deposit insurance for these banks (O'Hara & Shaw 1990). The problem with the too big to fail status of some banks appears in the form of moral hazard, which, in the banking context, means that the too big to fail banks engage in higher-risk behavior than they would without the knowledge of these government safety nets (Dam & Koetter 2012; Cordella & Yeyati 2003). It has been widely argued that the general ex-ante consensus assuming public policy that appoints some institutions the status of too big to fail caused the banks to take on the risk that resulted in the recent financial crisis, i.e.

the cause of moral hazard are not the programs themselves but the assumption that these measures will be taken in a time of crisis (Boyd & Heitz 2016).

3.1.1. Government Intervention's Effect in General

Critics of government intervention argue that the actions mispend tax money, unjustly reward banks and their shareholders, and worsen problems resultant from moral hazards. While, in turn, proponents of government intervention argue that the measures help mitigating the negative externalities resultant from weak balance sheets, reduced lending, and the spreading of financial crises. (Bond & Goldstein 2015.) Continuing on a critical note, e.g. Barth et al. (2004) find in their study that generous government-backed programs, which TARP is, in the form of deposit insurance schemes have a strong negative effect on bank stability. They also conclude that government ownership in banks result in worse banking outcomes and is positively correlated with corruption. In addition, they argue that government ownership of banks does not contribute to an environment of independent development, efficiency, or stability, controlling for other aspects of the regulatory and supervisory environment. Furthermore, Granja (2013) suggests that the interventions conducted during the financial crisis, including injecting capital into ailing financial institutions, are ultimately costly to taxpayers.

The arguments in favor of government intervention are often Pigouvian, based on A. Pigou's views, which are well-presented in e.g. Pigou (1951). These arguments are claiming that the presence of monopoly power, externalities, and informational asymmetries create a role for government interventions to potentially mitigate these market failures and hence improve social welfare of the society. The Pigouvian view assumes that there are market failures and that the government is able and willing act to salvage those failures. On the contrary, many disagree with the Pigouvian views. Some even argue that the failures are not highly significant in size. (Barth et al. 2004.)

In their study including a sample of 3 554 German banks from 1995 until 2006, Dam & Koetter (2012) produce robust results stating that government-imposed safety nets in the banking industry induce moral hazard. Gropp et al. (2011) studied a sample of more than 5 000 banks including observations from thirty different countries and found that banks with outright public ownership base took on higher risk, and that an increase in banks' competitors' government

guarantees had a significantly positive effect on the banks' risk-taking, while the protected banks themselves did not show higher risk-taking.

Nakashima (2016) studied Japan's two large-scale government-led capital injections in 1998 and 1999. He studied the capital injections' effects on risk, lending, and profitability of 21 Japanese banks in connection to the 1998 program and 15 Japanese banks in connection to the 1999 program. He finds that the programs reduced the risk of default of the banks receiving the capital injections, and that the programs did not substantially improve the profitability or the lending behavior of the capital-injected banks. However, he also states that the main reason for the lending behavior not improving was most likely due to their default risks increasing during the severe recession that began after the two programs.

Despite the subject having a relatively large amount of research conducted, the existing studies do not provide definitive conclusions on government interventions' impact on banking sector risk, due to the limitations of the used methodologies. The aforementioned results in policymakers having no clear guidance from the academic literature on how to react to problems in the banking sector amidst financial crises. (Hryckiewicz 2014.)

3.1.2. Comparisons of Means of Government Intervention

The effect of an individual intervention instrument always depends on the structure and effectiveness of the whole intervention program. The existing empirical research does not provide decisive conclusions regarding the optimal form of a government-led program or regarding the combinations of mechanisms that would most effectively mitigate the negative effects induced by government interventions. The absence of empirical evidence regarding the subject implies that policymakers have inadequate means to assess banking sector risk. (Hryckiewicz 2014.)

Philippon & Schnabl (2013) find that government interventions in the banking industry generate two types of rents for banks: informational and macroeconomic. They show in their paper that the most optimal intervention mitigates informational rents by using preferred stock with warrants as the means of injecting capital into the banks, as was done in the case of CPP and TIP. Additionally, they find that the macroeconomic rents are proposed to be minimized by conditioning implementation on sufficient participation from the banks. On the contrary to

Philippon & Schnabl's (2013) findings, House & Masatlioglu (2015) find that while equity investments by the government as a tool of providing stability amidst crises is an efficient way to increase investment, it also has a negative side-effect, which is reduced interbank market liquidity. They argue that asset purchases increase investment, and also interbank market liquidity, and is a more efficient way to mitigate the crises. In addition, they find that asset purchase programs allocate more funds to the banks that need them the most.

Hryckiewicz (2014) analyzes the long-term effects of various different government intervention measures on bank stability in her paper. She examines institutions during 23 different financial crises in 23 different countries. The regression estimations conducted in her study show that government interventions increase risk in the post-crisis periods and that this might be due to (at least) three factors: reduced market discipline, inefficient management, and a lack of restructuring processes. Rather than providing guidance for which types of intervention measures could be the most optimal, her study suggests that the ultimate focus in government intervention programs should be targeted towards creating mechanisms intensifying regulatory monitoring or providing greater market control as a counterweight for the automatic incentivizing of banks' risk-taking behavior.

Cordella & Yeyati (2003) compare the means of government intervention from a slightly different angle, not comparing different subsidy-like financial instruments themselves available for governments, but the ex-ante vs. ex-post nature of the intervention programs. They conclude that an ex-ante commitment induces moral hazard in the banks' behavior, but in the case of ex-post discretionary bailout programs, the "value effect" of the programs can effectively reduce the risk appetite of the banks, even more than offsetting the moral hazard's effect. By "value effect", the authors mean that the programs incentivize the banks to act prudentially by increasing the banks' charter value.

3.2. TARP'S EFFECT ON BANK PERFORMANCE

Hoshi & Kashyap (2010) argue in their study of Japanese banks that a financial rescue program's success is highly dependent on the willingness of the banks to participate in it. This is relevant for this study as the success of the financial rescue program is partly reflected through its effect on shareholders' returns under the period of the rescue program. With regards to TARP, the incentive for banks to participate was reduced due to the TARP injections being

senior to common shares and thus reducing the upside potential for shareholders in case of recovery of the bank in question (Bayazitova & Shivdasani 2012). This would contribute negatively to the stock price of the banks receiving TARP injections. On the other hand, Philippon & Schnabl (2013) argue that preferred stock investment, such as in TARP, is the most optimal form of government-led rescue program capital injections.

In line with Philippon & Schnabl's (2013) suggestion, Bayazitova & Shivdasani (2012) find in their study that the initial nine recipients of TARP funds gained strongly positive excess returns on October 14, 2008. They find that on average, the said excess return for the nine initial TARP recipients is 14.9 %, with a median of 17.4 %, and both their results are statistically significant at the 1% level. Despite this positive stock price reaction, Bayazitova & Shivdasani (2012) also find that TARP injections were seen as costly by the banks, and some banks chose not to participate in TARP or rejected the capital injections. Furthermore, they find that voluntary rejection of TARP funds was more often done by the healthier banks.

Bayazitova & Shivdasani (2012) show in their study that banks in which the CEOs compensation's were exceptionally high, had a higher probability for repaying TARP funds. The U.S. Government set restrictions in executive compensation for the banks that had participated in TARP. According to Bayazitova & Shivdasani (2012), this was a remarkable concern for the banks, and led to many of them to reject TARP injections and to decide to exit TARP. Furthermore, they find that the repayment of TARP funds was associated with statistically significant positive announcement returns. Bayazitova & Shivdasani (2012) also found in their study that the tier 1 common equity of TARP banks' capital remained unchanged by TARP injections.

Harris et al. (2013) conclude in their study utilizing nonparametric Data Envelopment Analysis that the operating efficiency of banks in the U.S. declined as a result of the latest financial crisis. They also find that the mean change in operating efficiency was notably worse for TARP banks in comparison to non-TARP banks, and argue that this finding was caused by moral hazards stemming from the bailout. They argue that the operating efficiency of the banks weakened as a result of TARP due to the government intervention reducing the managers' incentives to adopt best practices improving their banks' asset quality.

Berger & Roman (2015) find in their study using a difference-in-difference approach, that TARP resulted in competitive advantages for its recipients. They also conclude that TARP recipients increased their market shares as well as market power. They explain the results by arguing that the results may be driven primarily by investors perceiving TARP banks as safer than non-TARP banks, and that this effect is partially offset by TARP funds being relatively expensive for the recipient banks. They also argue that the competitive advantages the TARP banks received were primarily or entirely experienced only by the TARP banks that repaid the received funds to Treasury early.

Black & Hazelwood (2013) studied the risk-taking effect the TARP had on recipient banks. They categorize the studied banks into non-TARP and TARP banks, and into small, medium, and large banks. The total assets hurdles for medium and large banks are set at one and ten billion dollars, respectively. They find, that after the TARP injections, the risk rating of loan originations increased significantly for large TARP banks, while the same indicator decreased significantly for small TARP banks, relative to non-TARP banks. Their findings suggest that TARP's effect on banks' risk-taking differed depending on bank size. They also note, however, that these results may also be due to the TARP having conflicting objectives regarding capitalization and expanded lending. Said objectives of the TARP can be seen to have been what is stated in the Public Law § 5201's purposes, i.e. : “(1) to immediately provide authority and facilities that the Secretary of the Treasury can use to restore liquidity and stability to the financial system of the United States; and (2) to ensure that such authority and such facilities are used in a manner that— (A) protects home values, college funds, retirement accounts, and life savings; (B) preserves homeownership and promotes jobs and economic growth; (C) maximizes overall returns to the taxpayers of the United States; and (D) provides public accountability for the exercise of such authority.” (Pub. L. 110–343, div. A, § 2, Oct. 3, 2008, 122 Stat. 3766.).

One of the specific objectives of TARP was to improve the banks' balance sheets by the capital injections and consequently improve the banks' ability to borrow and lend (Calomiris & Khan 2015). A piece of evidence suggesting that TARP succeeded in improving banks' balance sheets is, that during the period December 31st, 2008–March 31st, 2009, the tier I capital ratio increased by 300 basis points in banks receiving TARP funds relative to an increase of only 40 basis points in non-TARP banks, on average (Calomiris & Khan 2015). In connection to these

specific objectives, there is also evidence supporting the claim that TARP recipient banks were more willing and able to increase lending than non-TARP banks (Li 2013).

Li (2013) finds in his paper concentrating on estimating stimulus effect that TARP injections had on the loan supply by provided by the banks, that TARP injections increased the loan supply. He finds that for banks with tier I capital ratios below median, the loan supply was increased by an annualized rate of 6.36 % due to TARP. He found the increase in all major loan types, and concludes, that this translates into a total of \$404 billion of additional loan capital provided by TARP banks. Li (2013) also states that TARP banks employed ca. a third of their TARP injections into new loans and used the remainder to strengthen their balance sheets. In addition, he concludes that little evidence exists to support the claim that loans issued by TARP recipients were of lower quality than those issued by non-TARP banks, and that overall, TARP provided a positive stimulus on loan supply during the financial crisis. However, the loan supply during the financial crisis decreased by 47 % during the fourth quarter of 2008 relative to third quarter and by 79 % relative to the second quarter of 2007 (Ivashina & Scharfstein 2010).

Farruggio et al. (2013) conducted an empirical study on TARP's first announcement's, revised TARP's announcement's, TARP capital injections', and TARP repayments' effects on shareholder value and the banks' risk exposure. They study the excess returns by calculating cumulated average abnormal returns and the risk by utilizing capital asset pricing model. They find in their study that the announcements and capital repayments induced positive wealth effects and risk decreases for the banks. On the other hand, they conclude that equity capital injections by the Treasury to banks are observed as a significant barrier to restore confidence and stability. In addition, they find that TARP announcements and injections increased systemic risk, but capital repayments induced no significant effect on systemic risk.

Khan & Vyas (2015) studied TARP's effect on banks' seasoned common equity offerings (SEOs). They find that only 12 % of losses accountable to the financial crisis were replenished through SEOs in 2009 and 2010. They find that SEOs were conducted by TARP recipients in higher relative amounts than other banks, and that it is not explained by TARP banks' economic or regulatory capital requirements. Their study concludes that SEOs by TARP banks in 2009 and 2010 cover 50 % of the total value of SEOs by U.S. banks during the period of 1994–2010. They control for economic and regulatory capital determinants of SEOs, and find, that TARP banks were more likely to arrange an SEO within four quarters after TARP receipt than non-

TARP banks. Further, they state that the proceeds gained from the SEOs were used to repay TARP funds without compromising loan growth. Their findings indicate that TARP was, overall, a remarkable event in the history of U.S. bank SEOs.

TARP mandated a forced issuance of TARP funds, in the form of preferred stock, by the largest banks, while the smaller participating banks were not forced to issue TARP preferred stock (Kim & Stock 2012). Kim & Stock (2012) conducted a study on TARP's effect on bonds, preferred stock, and common stock, focusing on two types of outstanding preferred stock: trust preferred stock, which is senior to TARP funds, and non-trust preferred stock, which has an equal claim with TARP funds. They find, that on the TARP announcement date, trust preferred stock gained more benefits from TARP receipt than non-trust preferred stock, and conclude that the finding is consistent with the priority rule theory, but inconsistent with the default theory. Their findings show that the effect persisted for banks which were forced to receive TARP funds and for banks that were not.

4. RESEARCH DESIGN

This section describes the design of the empirical study conducted as part of this thesis. The hypotheses of the empirical study are presented in this section. The data used in the empirical study and its sources are also introduced in this section. In addition, the regression models used in the empirical study as well as the specific variables used in the regression models are described in detail in this section.

4.1. HYPOTHESES

The main objective of this thesis is to study the TARP's effects on performance, and through this, contribute to answering the question regarding whether the TARP funds were allocated optimally and fairly among the U.S. banking industry. To complement the earlier literature presented in chapters 2 and 3, six hypotheses are formed. In accordance with e.g. Farruggio et al. (2013), the most fundamental and first hypothesis of this thesis is as follows:

H₁: The received TARP funds' relative size has an effect on the banks' performance.

If this hypothesis is confirmed, the funds can be argued to not have been allocated fairly, as the relative amount of TARP funds received should not have an observable effect on the banks as the sample includes all banks with sufficient data. Especially, if the relative amount has an observable positive effect on performance, the banks receiving more TARP funds relative to their size would have received an unfair competitive advantage from the government. To clarify the hypotheses and their ability to explain the studied effects, it is stated that if the post-TARP performance was compared to pre-TARP performance, the TARP banks improving their performance more would be an anticipated result and not indicate unfair allocation of TARP funds. But, as the TARP and non-TARP banks are compared with each other in the period one year after TARP, the fair allocation of the TARP funds would have to result in no significant effect of relative size of TARP funds received on the banks' performance.

In addition to the main hypothesis, more specific hypotheses are formed in order to complement the first hypothesis and to set the basis for acquiring more insight and structured sub-results from the study. Testing the second hypothesis provides more insight into how optimally and fairly the TARP funds were injected into the U.S. banks. Testing the additional hypotheses

divides the main hypothesis' theme into parts that individually provide information on the separate underlying factors comprising the result of studying the main hypothesis, i.e. the total performance of the banks. The second hypothesis is divided into four parts as follows:

H_{2a}: The received TARP funds' relative size has an effect on the banks' solvency.

H_{2b}: The received TARP funds' relative size has an effect on the banks' risk-taking.

H_{2c}: The received TARP funds' relative size has an effect on the banks' overall profitability.

H_{2d}: The received TARP funds' relative size has an effect on the banks' lending activities' profitability.

The third hypothesis is set in order to further assess the results of the first two models addressing the hypotheses H₁ and H₂. Testing the third hypothesis provides more insight for studying which factors have had the most influence on the banks' performance and moreover, what were the values of the indicators prior to the TARP investments. By gaining further insight into the state in which the banks were, measured by the performance indicators used in this thesis, it is possible to analyze the effects of TARP on performance in more depth. The third hypothesis is as follows:

H₃: The banks' prior performance has an effect on the banks' probability to receive TARP funds.

By testing the six hypotheses presented above, the study attempts to contribute to the existing literature by providing more detail into the research that is concerned with the effects of TARP on its recipients, their competitors, and the U.S. and global economies in general. The hypotheses are tested with the methods presented in chapter 4.4.

4.2. DATA

4.2.1. TARP Transaction Data

The information on the TARP contributions has been obtained from the U.S. Department of the Treasury's TARP Transaction Report, dated 27.1.2016. The Treasury publishes a TARP

Transaction Report including transaction-level information regularly: a new transaction report is published to the Treasury's website within two business days of the completion of any new transaction under the TARP programs. The information utilized in this thesis from the TARP Transaction Report includes information on the recipient's name, received TARP funds' total amount, and the first date on which each institution received TARP funds.

In cases where the same bank has received TARP funds to different state-specific individual entities, these TARP contributions have been consolidated and the earlier of the contribution dates has been assumed to be the TARP funding date. Due to this type of consolidations, the total number of financial institutions receiving TARP funds decreases to 698 individual institutions.

The received TARP funds' value is divided by the corresponding company's total assets in the end of the quarter preceding the corresponding company's date of receipt of TARP funds. The quarter in which the TARP funds are received is denoted as " q_0 " in this thesis, the one preceding it as " q_{-1} " and the one following it as " q_1 ", etc. The q_0 for banks not receiving TARP funds is determined to be the average of TARP receipt dates (24.2.2009), i.e. the first quarter of 2009. The banks for which no financial data or value for total assets was found for the end of the quarter preceding the receipt of TARP funds have been excluded from the sample. The received TARP funds' values are then allocated for each observation after the receipt and before the repayment of the TARP funds.

The time of repayment of TARP funds is defined as the date on which the last payment is issued to the Treasury. The repayment of TARP funds is assumed to be carried out only by the 649 entities that have an investment status of "Redeemed, in full; warrants not outstanding" or "Sold, in full; warrants not outstanding" according to the TARP Transaction Report mentioned earlier in this chapter. The observations after the quarter in which the TARP funds have been repaid are then not included in the observations that are defined as "during TARP". Additionally, for the entities not receiving TARP funds, the observations between Q2/2009 and Q2/2013 are defined as "during TARP". This is due to the average of the TARP receipt dates being 24.2.2009, i.e. on the first quarter of 2009 and the average of TARP repayment dates being 21.5.2013. The TARP repayment dates in the average calculation are assumed to be 31.12.2015 for the banks that have not repaid the received TARP funds at the report date of 27.1.2016.

4.2.2. Bank Financials – Base Data

The data used for assessing the banks' performance is based on Reports of Condition and Income ("Call Reports"). TARP was directed towards commercial banks, BHCs, savings and loan institutions, and other thrifts. This thesis excludes savings and loan institutions and other thrifts from all observations due to their data sets not being comparable with banks' data sets. These institutions are also not considered banks' primary competition (Berger & Roman 2015). In this thesis, for convenience, BHCs and independent commercial banks are referred to as "banks". The data is extracted from the Wharton Research Data Services' Bank Regulatory database under 49 different Call Report Codes. The performance indicators used in this thesis are then calculated from this data as described in section 4.3.3. Banks' reported financial information is then summed by bank holding companies. The banks are allocated under their respective BHC by the reported regulatory high holder RSSD ID. BHCs and independent commercial banks with more than one RSSD ID under the same name are then summed under the name. If a commercial bank is an independent entity, then the independent bank is treated as an independent entity similarly as an individual BHC. The procurement of bank financial data in this manner is in line with earlier studies regarding the subject of U.S. bank performance, for example Berger & Roman (2015), Duchin & Sosyura (2014), Liu et al. (2013), and Kashyap et al. (2002).

The financial information on banks has been extracted from the Wharton Research Data Services' Bank Regulatory and Commercial Banks databases. The latest date from which Call Report data is comprehensively available is the end of 2013. Data is therefore obtained for the period Q1/2006–Q4/2013. The base data described in this chapter is then further narrowed for the purpose of the model.

The observations with tier 1 common equity ratio of over 100 % are replaced with 100 % (16 observations) due to these being erroneous observations as it is impossible to have more common equity than the amount of total assets. The observations with nonperforming loans to total loans of more than 100 % (2 observations) have been replaced with 100 % due to the same reason. Observations with return on loans of more than 1 000 % have been excluded from the sample (6 observations) due to being erroneous or not representative of actual situation. Observations with illiquid assets to total assets of more than 1 000 % have been excluded (2 observations) due to being erroneous or not representative of actual situation. All of the

aforementioned adjustments have been made due to the extreme values being highly likely not representative of the true situation. These values are almost certainly resultant from allocations between the bank and its affiliated entities in assets or profits, or from errors in the data. The adjustments are made in order to exclude the effect of observations based on data points which are not representative of the actual situation. The amount of bank-quarters resultant from the abovementioned filtering is 211 270 from 8 725 different banks.

4.2.3. Bank Financials – Performance Effect Model’s Sample

The Performance Effect Model’s sample is extracted from the base data described in section 4.2.2. The Performance Effect Model’s sample includes all observations from the banks’ fourth quarters after receipt of TARP funds (q_4). The model includes observations for the banks that have sufficient data for the included periods for forming all of the variables of the Performance Effect model. The resultant number of observations is 3 896.

4.2.4. Bank Financials – Lagged Performance Effect Model’s Sample

The Lagged Performance Effect Model’s sample is extracted from the base data described in section 3.2.2. The Lagged Performance Effect Model’s sample includes all observations from the banks’ first quarters before the receipt of TARP funds (q_{-1}) and fourth quarters after receipt of TARP funds (q_4). The model includes observations for the banks that have sufficient data for the included periods for forming all of the variables of the Lagged Performance Effect model. The resultant number of observations is 2 986.

4.2.5. Bank Financials – TARP Receipt Probability Model’s Sample

The TARP Receipt Probability Model’s sample is extracted from the base data described in section 3.2.2. The TARP Receipt Probability Model’s sample includes all observations for the performance indicators from the banks’ first quarters before the receipt of TARP funds (q_{-1}) multiplied by 100 in order to study one percentage point changes’ effect as opposed to 100 pp changes. The model includes observations for the banks that have sufficient data for the included periods for forming all of the variables of the TARP Receipt Probability model.

4.3. VARIABLES

4.3.1. Received TARP Funds' Relative Size (Independent Variable)

The purpose of the independent variable is to describe the amount of received TARP funds by financial institution in proportion to each financial institution's size. This is conducted by calculating the received TARP funds divided by the financial institution's total assets (code BHCK2170 in the FR Y-9C Reporting Form) at the end of the quarter preceding the quarter in which the bank received the TARP funds as follows:

$$rTARP = TARP/TA, \quad (1)$$

where

rTARP = ratio of received TARP funds to total assets

TARP = received tarp funds as reported by the Treasury

TA = total assets as last reported at date of receipt of TARP funds

Using a bank's total assets as the denominator when proportioning a financial item to a company's size is common practice and in line with earlier studies by e.g. Cornett et al. (2013) and Lin & Zhang (2009). The resulting ratio (rTARP) is used as the independent variable defining the significance of the received TARP funds on each financial institution. For banks not receiving TARP funds, the value of rTARP is zero. If a bank has not yet received the TARP funds on a given bank-quarter, the value of rTARP for said bank-quarter is zero. Correspondingly, if a bank has repaid the received TARP funds on a given bank-quarter, the value of said bank-quarter's rTARP is zero.

4.3.2. TARP Receipt Dummy Variable (Independent Variable)

In addition to the rTARP variable presented above, a dummy variable indicating a bank having received TARP funds in connection to CPP or TIP is included in the TARP Receipt Probability Model in this thesis. This dummy variable, denoted as "TARP", takes the value of 1 if a bank has received TARP funds and the value of 0 if it has not. This variable is used in the TARP Receipt Probability Model studying the performance indicators' effect on likelihood of receiving TARP funds presented in section 4.4.3.

4.3.3. Bank Performance Indicators (Dependent Variables)

Bank performance indicators are used as dependent variables in order to study the received TARP funds' proportional size's effect on the banks' performance. The bank performance indicators are obtained from the banks' reported financial information (accounting-based information) as opposed to e.g. stock price information. The thirteen bank performance indicators used in this thesis have been selected in accordance with Cornett et al. (2013). In addition to the indicators used in this thesis, Cornett et al. (2013) included "Derivatives to total assets" in their study, but this indicator has been left out due to insufficient data available in the Call Reports. In addition, the variables including a profit & loss item as their numerator have been annualized. The chosen bank performance indicators are presented in Table 2 below.

The indicators have been calculated by first extracting the information under 49 different Call Report codes from the WRDS data base. These Call Report codes and their respective descriptions are presented in Appendix 1 of this thesis. In addition to these descriptions, information from The Federal Reserve Board's MDRM Data Dictionary (available at: <http://www.federalreserve.gov/apps/mdrm/data-dictionary>), regarding e.g. detailed descriptions of the codes and time intervals between which the codes have been in use, is used to complete the variable calculations.

Return on assets is calculated by dividing annualized RIAD4340 by RCFD2170. Tier I common equity ratio is calculated by dividing RCFD8274 by RCFD2170. Loan loss provision to total loans is calculated by dividing annualized RIAD4230 by the sum of RCFD2122 and RCFD2123. Nonperforming loans to total loans is calculated by dividing the sum of RCFDF639, RCFD1403, and RCFD2150 by the sum of RCFD2122 and RCFD2123. Noninterest expenses to total assets is calculated by dividing annualized RIAD4093 by RCFD2170. Noninterest income to total assets is calculated by dividing annualized RIAD4079 by RCFD2170. Return on loans is calculated by dividing annualized RIAD4010 by RCFD2170. Real estate loans to total loans is calculated by dividing RCFD1410 by the sum of RCFD2122 and RCFD2123. Liquidity ratio is calculated by dividing the sum of RCFD0071, RCFD0081, RCFD1754, and RCFD1773 by RCFD2170. Illiquid assets to total assets is calculated by dividing the sum of RCFD2122, RCFD301, RCFD303, RCFD305, RCFD307, RCFD309, RCFD311, RCFD313, RCFD315, RCFD317, RCFD319, RCFD321, and RCFD323 or the sum of RCFD8509, RCFD8511, RCFDC027, and RCFDC988

(depending on the report date, as the different sums represent the same assets, but under different codes which change from time to time) by RCFD2170. Core deposits to total assets is calculated by dividing the sum of RCON2215 and RCON6648 by RCFD2170. Deposit growth rate is calculated by calculating the percent change of the sum of RCON2215 and RCON6648 from the latest reported quarter and dividing it by the value of RCFD2170 in the quarter preceding the current quarter and annualizing the resultant rate. Unused loan commitments to total loan commitments plus total assets is calculated by dividing the sum of RCON3814, RCON3815, RCON3817, RCON6550, RCON6648, RCONF164, RCONF165, RCONJ457, RCONJ458, and RCONJ459 by the sum of the sum of RCFD2122, RCFD2123, and RCFD2170. The annualized indicators have been formed using the formula below:

$$\text{Annualized Indicator} = [(1 + \text{Quarterly Indicator})^4] - 1 \quad (2)$$

TABLE 2. DEFINITION OF BANK PERFORMANCE INDICATORS

The bank performance indicators selected for the empirical study in accordance with Cornett et al. (2013) are listed in this table. The numbering for the purpose of formula creation is presented on the first column (No.), name of the variable in the second column (Variable) and a description on how the variable has been calculated from the Call Report data in the third column (Variable description).

No.	Variable	Variable description
(1)	Return on assets	Annualized net income after taxes as a percent of total assets.
(2)	Tier I common equity ratio	Tier I common equity as a percent of total assets.
(3)	Loan loss provision to loans	Annualized loan loss provision expense as a percent of total loans and leases.
(4)	Nonperforming loans to total loans	Total loans and leases more than 90 days past due plus nonaccruing loans and leases plus other real estate owned as a percent of total loans and leases.
(5)	Noninterest expenses to total assets	Annualized noninterest expenses as a percent of total assets.
(6)	Noninterest income to total assets	Annualized noninterest income as a percent of total assets.
(7)	Return on loans	Annualized interest and fees on loans to total loans and leases.
(8)	Real estate loans to total loans	Real estate loans as a percent of total loans.
(9)	Liquidity ratio	Cash and book value of total investment securities as a percent of total assets.
(10)	Illiquid assets to total assets	Loans and leases net of unearned income and allowances + MBS and ABS held-to-maturity securities + MBS and ABS available-for-sale securities as a percent of total assets.
(11)	Core deposits to total assets	Transactions deposits plus non-transaction deposits under \$100,000 as a percent of total assets.
(12)	Deposit growth rate	Annualized change in core deposits as a percent of core deposits in the previous quarter.
(13)	Unused loan commitments to total loan commitments plus total assets	Unused loan commitments at as a percent of total loan commitments plus total assets.

4.3.4. Control Variables

Two control variables are used in the empirical study to mitigate problems caused by potential omitted variables. Firstly, the model controls for size of the banks. The size of the bank is measured as total assets of the bank in \$ billion as last reported before the receipt of TARP funds (variable “Size”), which is in line with e.g. Berger & Roman (2015) and Liu et al. (2013). In addition, e.g. Harris et al. (2013) state that larger banks had a higher probability of receiving funding under TARP than smaller banks, due to the fact that they posted a greater systematic risk to the financial system compared to the smaller banks. This supports the need of size as a control variable. Secondly, the effects of the banks’ belonging to a multi-bank BHC structure is controlled for with the dummy variable “BHC”, which takes the value of 1 if the bank is a BHC or is controlled by a BHC and the value 0 if not. Whether a bank belongs to a multi-bank

structure under a BHC is important information due to these entities' profitability and capital structure indicators being exposed to potential internal capital market allocations that do not necessarily reflect the individual entity's performance (Houston et al. 1997). Controlling for BHC is in line with e.g. Berger & Roman (2015).

4.4. REGRESSION MODELS

Three regression models are used in this thesis in order to evaluate TARP funds' effect on banks' performance and to analyze the related most important other factors in order to form a comprehensive view on the phenomenon. The Performance Effect model described in section 4.4.1 is the core model that analyzes the actual effect that TARP funds have had on bank performance. The Lagged Performance Effect Model described in section 4.4.2 complements the previously mentioned model by analyzing q_{-1} performance's effect on q_4 performance. Finally, the TARP Receipt Probability Model described in section 4.4.3 complements the abovementioned models by analyzing q_{-1} performance's effect on a bank's probability to receive TARP funds.

4.4.1. Core Model – Performance Effect Model

The Performance Effect Model is used to study the performance effect of the relative size of the TARP contribution to a bank. The Performance Effect Model is an Ordinary Least Squares (“OLS”) regression model. The Performance Effect Model estimates the TARP contribution's relative size's effect on the banks performance on q_4 (the fourth quarter after the receipt of TARP funds). For the non-TARP banks, the q_0 (TARP receipt quarter) is defined as the average TARP receipt quarter, which is the first quarter of 2009. The OLS regression model's variables are presented in more detail in chapter 4.3. The model's formula for each bank-quarter's performance indicators $i = (1, 2, \dots, 13)$ is as follows:

$$Performance_{iq4} = \beta_{0i} + \beta_{1i}rTARP_{q0} + \beta_{2i}BHC + \beta_{3i}Size_{q-1} + \varepsilon_i, \quad (3)$$

where

Performance = performance indicator variables 1–13 presented in Table 2

β_0 = intercept

rTARP = ratio of received TARP funds to total assets at receipt of TARP funds

BHC = dummy variable indicating whether the bank is part of a multi-bank structure

Size = total assets as last reported before receipt of TARP funds in \$ billion
 ε = error term

4.4.2. Lagged Performance Effect Model

The Lagged Performance Effect Model is used to study the banks' q_{-1} (latest reported quarterly figures before receipt of TARP funds) performance's effect on the respective q_4 performance. The Lagged Performance Effect Model is an Ordinary Least Squares ("OLS") regression model similar to the Performance Effect Model with the performance indicators' q_{-1} values added as independent variables. For the non-TARP banks, the q_0 (TARP receipt quarter) is defined as the average TARP receipt quarter, which is the first quarter of 2009.

The Lagged Performance Effect Model is used in order to bring further robustness to the Performance Effect Model's analysis and to separate the earlier performance's coefficient of determination associated with the future performance from the Performance Effect Model. The lagged performance indicators are used in order to control for the endogeneity of the performance of the banks by including the lagged performance values. This is in line with e.g. Larcker & Rusticus (2010), who state that the use of lagged values of an endogenous variable controls for the endogeneity, given that the exogenous part of the variable persists over time and that the endogenous part does not. Due to the banks' earlier performance highly probably affecting the banks' performance at the time of observation, the Lagged Performance Effect Model is created to control for this potential problem arising from the timing of observations.

The variables included in the Lagged Performance Effect Model are presented in more detail in chapter 4.3. The model's formula for each bank-quarter's performance indicators $i = (1, 2, \dots, 13)$ is as follows:

$$\begin{aligned} Performance_{iq_4} = & \beta_{0i} + \beta_{1i}rTARP_{q_0} + Performance_{iq_{-1}} + \\ & \beta_{2i}BHC + \beta_{3i}Size_{q_{-1}} + \varepsilon_i, \end{aligned} \quad (4)$$

where

Performance = performance indicator variables 1–13 presented in Table 2

β_0 = intercept

rTARP = ratio of received TARP funds to total assets at receipt of TARP funds

BHC = dummy variable indicating whether the bank is part of a multi-bank structure

Size = total assets as last reported before receipt of TARP funds in \$ billion
 ε = error term

4.4.3. TARP Receipt Probability Model

The TARP Receipt Probability Model assesses the relationship between the receipt of TARP funds and the performance of the banks before the receipt of TARP funds. The model is used as a support model in this thesis to provide further insight into the conclusions drawn from the Performance Effect Model. The TARP Receipt Probability Model is a binary logistic regression model. The dummy variable TARP defined in section 4.3.2 is used as the independent variable in this model. The performance indicators values are observed on the quarter before the receipt of TARP funds ($q-1$). The performance indicators' values are multiplied by 100 in order to observe the effects of 1 pp changes in the indicators instead of 100 pp changes. For the non-TARP banks, the q_0 (TARP receipt quarter) is defined as the average TARP receipt quarter, which is the first quarter of 2009. The model's formula is as follows:

$$\begin{aligned}
 p &= E(TARP = 1 | \beta'X) \\
 \text{logit}(p) &= \ln\left(\frac{p}{1-p}\right) = \beta'X \\
 \beta'X &= \beta_0 + \sum_{i=1}^{13} \beta_i \text{Performance}_{iq-1} \times 100 + \beta_{14} BHC + \\
 &\quad \beta_{15} \text{Size}_{q-1} + \varepsilon,
 \end{aligned} \tag{5}$$

where

Performance = performance indicator variables 1–13 presented in Table 2

β_0 = intercept

TARP = dummy variable indicating whether the bank received TARP funds

BHC = dummy variable indicating whether the bank is part of a multi-bank structure

Size = total assets as last reported before receipt of TARP funds in \$ billion

ε = error term

5. RESULTS

This section presents the results of the empirical study. First, summaries of the statistics of the base data and the samples used in the empirical study are presented. Secondly, the correlations between the variables used in the models are presented and interpreted. The last chapter of this section presents the results and interpretation of the Performance Effect Model, the Lagged Performance Effect Model, and the TARP Receipt Probability Model.

5.1. SUMMARY STATISTICS

The summary statistics for the base data and for the Performance Effect Model's sample are presented in this chapter. The summary statistics for the base data described in chapter 4.2.2 is presented in Table 3 below. Noninterest expenses to total assets and noninterest income to total assets have high standard deviations of over 300 % due to the different operating models of the sample's banks. Deposit growth rate and unused loan commitments to total loan commitments plus total assets have very high standard deviations due to a small amount of extreme values in both of the variables' data. This can be observed from the percentile statistics presented in Table 3, as in e.g. the Deposit growth rate variable, the mean is notably higher than the lowest value included in the 99th percentile. The other variables' standard deviations are ca. 20 % or less. The base data's high-variance variables' samples are shown in Figure 2 on page 34. The total amount of bank-quarters in the dataset is 211 270, and the variable with least observations is loan loss provision to loans with 169 030 observations.

TABLE 3. SUMMARY STATISTICS FOR THE BASE DATA

The table presents the variables' (set out in chapter 4.3) minimum values (Min.), maximum values (Max.), arithmetic means (Mean), medians (Median), standard deviations (Std. Dev.), highest values of first percentile (1st pctl.), lowest values of 99th percentile (99th pctl.), and number of bank-quarter observations (N) in the base data for the period Q1/2006–Q4/2013 described in chapter 4.2.2.

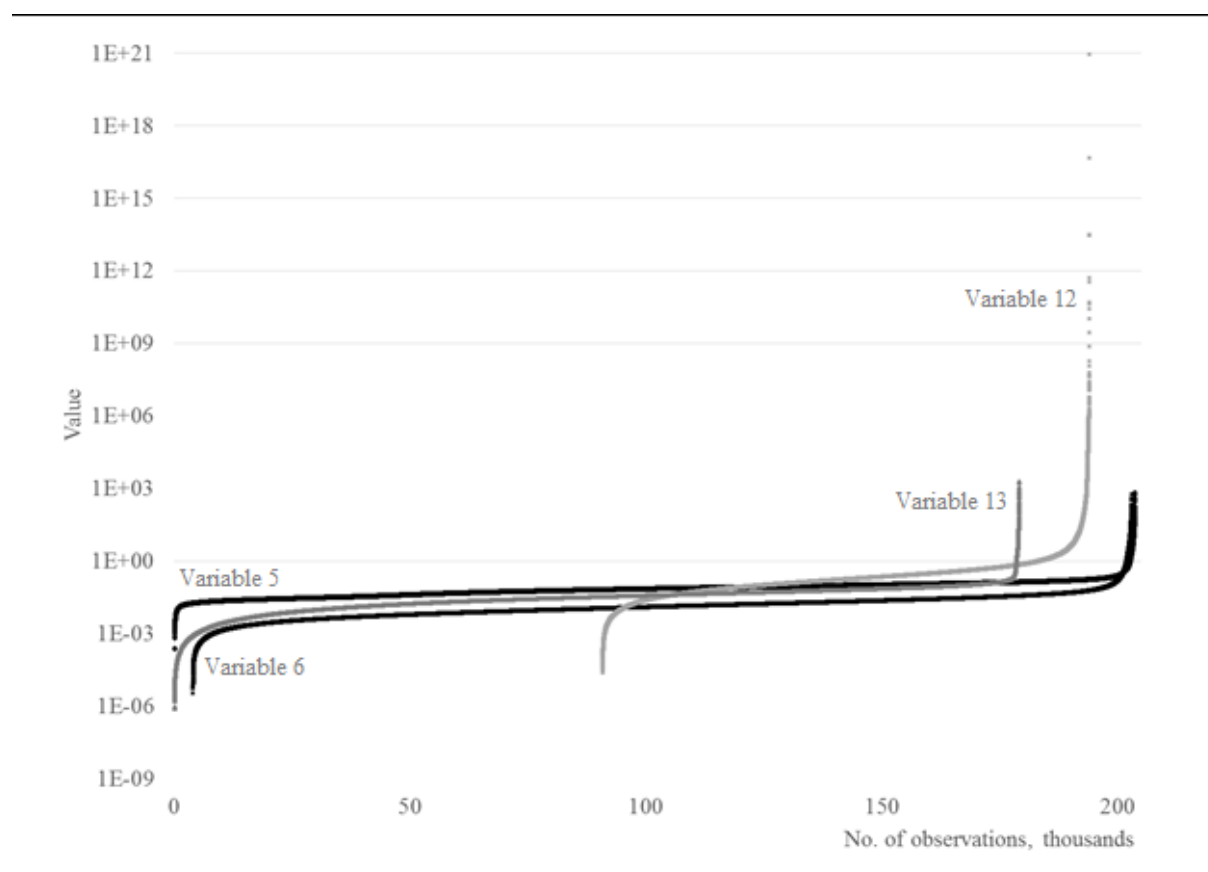
Variable	Mean	Median	Std. Dev.	1 st pctl.	99 th pctl.	N
Dependent variables						
(1) Return on assets	1.64 %	1.62 %	5.19 %	-14.98 %	10.98 %	174 326
(2) Tier I common equity ratio	11.16 %	9.62 %	7.44 %	4.12 %	45.10 %	203 757
(3) Loan loss provision to loans	1.91 %	0.77 %	4.44 %	-1.02 %	19.21 %	169 030
(4) Nonperforming loans to total loans	3.02 %	1.54 %	4.59 %	0.02 %	22.09 %	182 367
(5) Noninterest expenses to total assets	16.61 %	7.40 %	365.08 %	1.55 %	38.05 %	203 729
(6) Noninterest income to total assets	10.77 %	1.26 %	328.80 %	-0.51 %	26.94 %	203 011
(7) Return on loans	17.81 %	16.79 %	10.07 %	4.72 %	40.43 %	201 780
(8) Real estate loans to total loans	69.68 %	73.65 %	20.02 %	5.57 %	99.62 %	204 915
(9) Liquidity ratio	28.87 %	26.09 %	16.48 %	1.89 %	78.86 %	208 584
(10) Illiquid assets to total assets	69.96 %	73.37 %	16.45 %	12.59 %	94.68 %	209 189
(11) Core deposits to total assets	42.49 %	44.51 %	14.02 %	9.01 %	70.05 %	202 203
(12) Deposit growth rate	4.65e ¹⁵	1.62 %	2.05e ¹⁸	-87.73 %	1894.29 %	193 987
(13) Unused loan commitments to total loan commitments plus total assets	26.28 %	3.23 %	1287.61 %	0.03 %	17.59 %	179 203
Independent variables						
rTARP	0.10 %	0.00 %	0.72 %	0.00 %	2.61 %	211 270
Control variables						
BHC	0.720	1	0.451	0	1	211 270
Size (Total assets \$ billion)	2.394	0.159	44.573	0.01	26.27	211 270

The high-variance variables (noninterest expenses to total assets, noninterest income to total assets, deposit growth rate, and unused loan commitments to total loan commitments plus total assets) in the base data are presented plotted on a logarithmic scale (base 1 000) in the figure below. The extremely high values in the first two variables are most likely the result of intragroup allocations and extreme situations where the bank in question is near bankruptcy

hence having a very low amount of total assets. The extremely high values in the last two variables are likely due to intragroup allocations.

FIGURE 2. BASE DATA'S HIGH-VARIANCE VARIABLES

The figure below presents the base data's four highest-variance variables' observations plotted on a logarithmic (base 1 000) scale. The variables presented are noninterest expenses to total assets (Variable 5), noninterest income to total assets (Variable 6), deposit growth rate (Variable 12), and unused loan commitments to total loan commitments plus total assets (Variable 13). Negative and zero values are not plotted on the figure.



Summary statistics for the Performance Effect Model's sample are presented in Table 4 below. Additionally, selected summary statistics for the sample's non-TARP and TARP banks separately is presented in Table 5 below. The sample includes 3 896 observations for all variables as the bank-quarters with incomplete data have been excluded from the sample. 436 of the sample's observations are TARP banks and 3 460 are non-TARP banks. The relative standard deviations of the variables are similar as in the base data. Noninterest expenses to total assets, noninterest income to total assets, deposit growth rate and unused loan commitments to total loan commitments plus total assets all have high standard deviations in the Performance Effect Model's sample. The last mentioned two variables' means are higher than their respective lowest values included in the 99th percentile.

TABLE 4. SUMMARY STATISTICS FOR THE PERFORMANCE EFFECT MODEL'S SAMPLE

The table presents the variables' (set out in chapter 4.3) minimum values (Min.), maximum values (Max.), arithmetic means (Mean), medians (Median), standard deviations (Std. Dev.), highest values of first percentile (1st pctl.), lowest values of 99th percentile (99th pctl.), and number of bank-quarter observations (N) in the Performance Effect Model's sample described in chapter 4.2.3.

Variable	Mean	Median	Std. Dev.	1 st pctl.	99 th pctl.	N
Dependent variables						
(1) Return on assets	0.20 %	0.61 %	2.54 %	-10.50 %	3.26 %	3 896
(2) Tier I common equity ratio	9.64 %	9.14 %	3.08 %	2.55 %	20.06 %	3 896
(3) Loan loss provision to loans	1.47 %	0.55 %	4.52 %	-0.01 %	14.88 %	3 896
(4) Nonperforming loans to total loans	4.45 %	2.75 %	5.40 %	0.05 %	27.34 %	3 896
(5) Noninterest expenses to total assets	3.57 %	3.03 %	2.50 %	1.39 %	14.83 %	3 896
(6) Noninterest income to total assets	0.81 %	0.57 %	1.49 %	-0.45 %	6.27 %	3 896
(7) Return on loans	7.15 %	6.30 %	3.72 %	4.67 %	26.84 %	3 896
(8) Real estate loans to total loans	73.80 %	76.64 %	16.24 %	25.83 %	99.18 %	3 896
(9) Liquidity ratio	26.47 %	24.40 %	13.10 %	4.23 %	63.90 %	3 896
(10) Illiquid assets to total assets	73.29 %	75.04 %	11.54 %	38.36 %	92.98 %	3 896
(11) Core deposits to total assets	41.63 %	42.75 %	12.76 %	12.87 %	68.49 %	3 896
(12) Deposit growth rate	3.198e ²	-4.68 %	1.607e ⁴	-78.45 %	969 %	3 896
(13) Unused loan commitments to total loan commitments plus total assets	5.24 %	4.55 %	7.69 %	0.30 %	15.63 %	3 896
Independent variables						
rTARP	0.28 %	0.00 %	1.11 %	0.00 %	3.69 %	3 896
Control variables						
BHC	0.764	1	0.425	0	1	3 896
Size (Total assets \$ billion)	1.718	0.177	41.219	0.02	7.76	3 896

TABLE 5. SELECTED SUMMARY STATISTICS BY TARP STATUS

The table presents the variables' (set out in chapter 3.3) arithmetic means (Mean), medians (Median), and standard deviations (Std. Dev.) separately for TARP banks and non-TARP banks in the Performance Effect Model's sample described in chapter 3.2.3. The TARP banks column includes observations for the 436 banks in the sample that received TARP funds. The non-Tarp banks column includes observations for the 3 460 banks in the sample that did not receive TARP funds. The TARP and non-TARP banks' means with differences statistically significant at the 1 % level according to Welch's t-test have been bolded in the TARP Banks column. The TARP and non-TARP banks' medians with differences statistically significant at the 1 % level according to Mann-Whitney *U* test have been bolded in the TARP Banks column.

Variable	TARP Banks			Non-TARP Banks		
	Mean	Median	Std. Dev.	Mean	Median	Std. Dev.
Dependent variables						
(1) Return on assets	-0.62 %	0.39 %	4.75 %	0.31 %	2.09 %	0.62 %
(2) Tier I common equity ratio	9.07 %	8.87 %	2.0 %	9.71 %	3.18 %	9.2 %
(3) Loan loss provision to loans	4.39 %	1.77 %	6.7 %	1.10 %	4.02 %	0.5 %
(4) Nonperforming loans to total loans	5.04 %	4.02 %	4.21 %	4.38 %	5.52 %	2.59 %
(5) Noninterest expenses to total assets	7.00 %	4.78 %	5.59 %	3.14 %	1.20 %	2.97 %
(6) Noninterest income to total assets	1.90 %	0.88 %	3.29 %	0.67 %	0.99 %	0.55 %
(7) Return on loans	13.37 %	10.78 %	8.44 %	6.37 %	1.07 %	6.26 %
(8) Real estate loans to total loans	77.15 %	79.02 %	13.50 %	73.38 %	16.50 %	76.02 %
(9) Liquidity ratio	21.78 %	20.59 %	10.16 %	27.06 %	13.31 %	25.14 %
(10) Illiquid assets to total assets	78.61 %	80.17 %	9.62 %	72.62 %	11.59 %	74.34 %
(11) Core deposits to total assets	34.35 %	33.43 %	12.29 %	42.54 %	12.52 %	44.13 %
(12) Deposit growth rate	139.29 %	-4.66 %	1501.95 %	3.599e ²	1.706e ⁴	-4.68 %
(13) Unused loan commitments to total loan commitments plus total assets	5.30 %	4.70 %	3.45 %	5.23 %	8.07 %	4.52 %
Independent variables						
rTARP	2.53 %	2.33 %	2.30 %	0.00 %	0.00 %	0.00 %
Control variables						
BHC	0.846	1	0.361	0.753	0	1.000
Size (Total assets \$ billion)	11.995	0.456	122.669	0.424	1.391	0.163

5.2. STUDY OF CORRELATIONS

5.2.1. Correlations in the Base Data

Correlations between the base data's variables are presented in Table 6 below. The vast majority of the correlations are statistically significant at the 1 % level. A clear exception is the 12th variable, deposit growth rate, which correlates only with return on assets and tier I common equity ratio at a 5 % level of significance. The reason for the low significances for the variable's correlations is the high variance, which is described and discussed in more detail in the previous section. Only 11 of the 120 calculated Pearson correlation coefficients between the variables are over 0.2 or under -0.2.

The highest correlation (Pearson coefficient 0.853) exists between noninterest expenses to total assets and noninterest income to total assets. The correlation between these was expected due to it being likely that a bank with a high or low amount of non-lending activity is expected to have high or low amounts of noninterest expenses and noninterest income, respectively. The second most evident correlation (Pearson coefficient -0.600) exists between illiquid assets to total assets and liquidity ratio. The negative correlation was expected due to the numerators of the two variables are mutually exclusive, i.e. if a bank has more ABS and MBS securities in its balance sheet, it decreases the percentage of its investment securities' share of its total assets. Loan loss provision to loans and nonperforming loans to total loans are moderately highly negatively correlated with return on assets (Pearson coefficients -0.493 and -0.445, respectively). This is an expected correlation due to the variables numerators' increase having a negative effect on a bank's earnings. Loan loss provision to loans and nonperforming loans to total loans are also moderately highly correlated with each other (Pearson coefficient 0.396). All other correlation coefficients within the dataset are under 0.3, but no less than -0.3 in value.

TABLE 6. CORRELATIONS IN THE BASE DATA

The table presents the base data's variables' Pearson and Spearman correlation coefficients. The numbered variables' explanations are presented in Table 2. The correlations are conducted pairwise, i.e. the number of observations varies between the correlation coefficients. The maximum amount of observations for a correlation between two variables in the sample is 211 270 and the respective minimum amount is 144 151. Statistical significance is indicated by * and ** at the 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	rTARP	BHC	Size
(1)		.100**	-.493**	-.445**	.091**	.181**	.265**	-.167**	.105**	-.021**	.069**	.005*	.055**	-.049**	.053**	.005*
(2)	.100**		-.014**	-.141**	.119	.149**	-.033**	-.067**	.190**	-.293**	-.145**	.005	.136**	-.035**	-.267**	-.023**
(3)	-.493**	-.014**		.396**	.069**	.038**	.191**	.027**	-.066**	.036**	-.020**	-.001**	.049*	.071**	-.018**	.021**
(4)	-.445**	-.141**	.396**		.025**	-.007**	-.047**	.218**	-.049**	-.012**	-.026**	-.002**	-.022**	.076**	-.024**	-.009**
(5)	.091**	.119**	.069**	.025**		.853**	.087**	-.002**	.002**	-.045**	-.027**	.000**	.139**	-.003**	-.038**	-.001**
(6)	.181**	.149**	.038**	-.007**	.853**		.051**	-.034**	.005**	-.044**	-.035**	.002**	.137**	-.004*	-.045**	-.001**
(7)	.265**	-.033**	.191**	-.047**	.087**	.051**		-.091**	-.006**	-.026**	.113**	-.002**	.050**	-.037**	.015**	-.014**
(8)	-.167**	-.067**	.027**	.218**	-.002	-.034**	-.091**		-.186**	.287**	-.241**	.000**	-.117**	.047**	-.044**	-.057**
(9)	.105**	.190**	-.066**	-.049**	.002	.005*	-.006**	-.186**		-.600**	.099**	-.003**	.043**	-.046**	-.044	-.020**
(10)	-.021**	-.293**	.036**	-.012**	-.045**	-.044**	-.026**	.287**	-.600**		-.179**	.004**	-.070**	.062**	.130**	-.041**
(11)	.069**	-.145**	-.020**	-.026**	-.027**	-.035**	.113**	-.241**	.099**	-.179**		-.003**	-.033**	-.102**	.059**	-.094**
(12)	.005*	.005*	-.001	-.002	.000	.002	-.002	.000	-.003	.004	-.003		.000*	.000**	-.004**	.000**
(13)	.055**	.136**	.049**	-.022**	.139**	.137**	.050**	-.117**	.043**	-.070**	-.033**	.000		-.002**	-.031**	-.001**
rTARP	-.049**	-.035**	.071**	.076**	-.003	-.004	-.037**	.047**	-.046**	.062**	-.102**	.000	-.002		.025**	.025**
BHC	.053**	-.267**	-.018**	-.024**	-.038**	-.045**	.015**	-.044**	-.044**	.130**	.059**	-.004	-.031**	.025**		.014**
Size	.005*	-.023**	.021**	-.009**	-.001	-.001	-.014**	-.057**	-.020**	-.041**	-.094**	.000	-.001	.025**	.014**	

Pearson Correlation Coefficients

Spearman Correlation Coefficients

5.2.2. Correlations in the Performance Effect Model's Sample

Correlations between the Performance Effect Model's sample's variables are presented in Table 7 below. The vast majority of the correlations are statistically significant at the 1 % level. As in the base data, the 12th variable, deposit growth rate, is the only one without significant correlations at the 1 % level with the other variables. The reason for the low significances for the variable's correlations is the high variance, which is described and discussed in more detail in section 5.1. In the sample, 19 of the 120 calculated Pearson correlation coefficients between the variables are over 0.2 or under -0.2. Respectively, 11 of 120 are over 0.3 or under -0.3, and 4 of 120 are over 0.5 or under -0.5. The independent variable rTARP is not highly correlated with any of the dependent or control variables. Moderate correlation is observed with return on loans (Pearson coefficient 0.392) and noninterest expenses to total assets (Pearson coefficient 0.325), both significant at the 1 % level.

The highest correlation (Pearson coefficient 0.771) exists between noninterest expenses to total assets and return on loans. The second highest correlation (Pearson coefficient -0.766) exists between loan loss provision to loans and return on assets. This is an expected correlation due to loan loss provisions' increase having a negative effect on a bank's earnings and thus on the return on assets. The third most evident correlation (Pearson coefficient -0.677) exists between illiquid assets to total assets and liquidity ratio. The reasons for the correlation are discussed in the previous section. The fourth highest correlation (Pearson coefficient 0.563) exists between noninterest expenses to total assets and noninterest income to total assets. The reasons for the correlation are discussed in the previous section.

TABLE 7. CORRELATIONS IN THE PERFORMANCE EFFECT MODEL'S SAMPLE

The table presents the Performance Effect Model's Pearson and Spearman correlation coefficients. The numbered variables' explanations are presented in Table 2. The number of observations for all correlations is 3 896. Statistical significance is indicated by * and ** at the 5% and 1% levels, respectively.

	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	rTARP	BHC	Size
(1)		.241**	-.427**	-.499**	-.275**	.222**	.269**	-.287**	.156**	-.109**	.054**	.021	.056**	-.081**	.150**	-.012
(2)	.282**		-.181**	-.187**	-.090**	-.066**	.135**	-.092**	.151**	-.161**	.021	.016	-.012	-.052**	-.203**	-.229**
(3)	-.767**	-.195**		.467**	.174**	.065**	.050**	.070**	-.162**	.182**	-.142**	-.024	-.016	.291**	.061**	.239**
(4)	-.439**	-.273**	.281**		.209**	-.029	-.117**	.285**	-.177**	.108**	-.046**	-.115**	-.143**	.131**	.024	.190**
(5)	-.366**	-.081**	.331**	.111**		.468**	.314**	.010	-.163**	.065**	.014	-.056**	-.026	.273**	.013	-.092**
(6)	.079**	-.020	.107**	-.016	.563**		.214**	-.113**	.044**	-.083**	-.024	-.042**	.076**	.173**	.251**	.225**
(7)	-.140**	-.009	.352**	-.006	.771**	.394**		-.258**	.065**	-.149**	.216**	.028	-.286**	.219**	.066**	-.269**
(8)	-.107**	-.098**	-.014	.258**	.024	-.032*	-.033*		-.191**	.210**	-.216**	.038*	-.174**	.073**	-.177**	.268**
(9)	.123**	.188**	-.082**	-.150**	-.111**	.001	-.045**	-.191**		-.664**	.093**	.049**	-.079**	-.131**	.008	-.078**
(10)	-.087**	-.189**	.072**	.050**	.095**	-.028	.055**	.223**	-.677**		-.228**	-.048**	.132**	.193**	-.026	.222**
(11)	-.006	-.015	-.036*	.019	-.081**	-.078**	-.081**	-.208**	.087**	-.211**		.105**	-.242**	-.198**	.060**	-.474**
(12)	.006	.003	-.005	-.011	-.006	-.003	-.005	.021	-.010	.010	.002		-.057**	.001	-.102**	-.063**
(13)	.059**	.041*	-.048**	-.087**	.075**	.092**	.049**	-.163**	-.003	.033*	-.077**	.004		.024	.106**	.250**
rTARP	-.099**	-.025	.161**	.031	.325**	.144**	.392**	.067**	-.100**	.137**	-.161**	-.005	.003		.060**	.242**
BHC	.060**	-.224**	.026	.006	.034*	.101**	.067**	-.144**	-.012	-.008	.047**	-.036*	.008	.015		.204**
Size	-.018	-.022	.122**	.000	.121**	.167**	.121**	-.049**	-.002	-.033*	-.081**	-.001	.029	.062**	.019	

Spearman Correlation Coefficients

5.3. RESULTS OF THE PERFORMANCE EFFECT MODEL

The results including coefficients with statistical significance indicators, standard errors, and adjusted R^2 statistics of the Performance Effect Model are presented in Table 8 below. The variables and details of the model itself are presented in chapter 4.

TABLE 8. RESULTS OF THE PERFORMANCE EFFECT MODEL

The table presents the regression parameter estimates for the Performance Effect Model. The independent variable, rTARP, is the received TARP funds' size divided by total assets. Dependent variables are measured at fourth quarter after receipt of TARP funds and annualized. The control variable "Size" is measured in \$ billions. Standard errors are reported in parentheses and the adjusted R^2 statistic on the right hand side. The model includes 3 896 observations for each variable. Statistical significance is indicated by * and ** at the 5% and 1% levels, respectively.

Dependent variables	Independent variable	Control variables		Adj. R^2
	rTARP	BHC	Size	
Return on assets	-.227** (.037)	.004** (.001)	-8.019e ⁻⁰⁶ (9.844e ⁻⁰⁶)	.013
Tier I common equity ratio	-.057 (.043)	-.016** (.001)	-1.250e ⁻⁰⁵ (1.169e ⁻⁰⁵)	.050
Loan loss provision to loans	.627** (.064)	.002 (.002)	.000** (1.726e ⁻⁰⁵)	.038
Nonperforming loans to total loans	.152 (.078)	.001 (.002)	-2.358e ⁻⁰⁶ (2.102e ⁻⁰⁵)	.000
Noninterest expenses to total assets	.719** (.034)	.002 (.001)	6.133e ⁻⁰⁵ ** (9.157e ⁻⁰⁶)	.116
Noninterest income to total assets	.179** (.021)	.003** (.001)	5.701e ⁻⁰⁵ ** (5.662e ⁻⁰⁶)	.054
Return on loans	1.293** (.049)	.005** (.001)	8.672e ⁻⁰⁵ ** (1.324e ⁻⁰⁵)	.166
Real estate loans to total loans	1.054** (.232)	-.055** (.006)	.000** (6.240e ⁻⁰⁵)	.027
Liquidity ratio	-1.185** (.189)	-.003 (.005)	1.539e ⁻⁰⁵ (5.079e ⁻⁰⁵)	.009
Illiquid assets to total assets	1.455** (.165)	-.003 (.004)	.000** (4.452e ⁻⁰⁵)	.020
Core deposits to total assets	-1.814** (.182)	.015** (.005)	.000** (4.889e ⁻⁰⁵)	.033
Deposit growth rate	-6539.079 (23257.408)	-1351.925* (606.419)	.111 (6.260)	.001
Unused loan commitments to total loan commitments plus total assets	.007 (.111)	.001 (.003)	5.323e ⁻⁰⁵ (2.996e ⁻⁰⁵)	.000

The model's adjusted R^2 statistics are relatively low in the majority of dependent variables' cases. Only noninterest expenses to total assets and return on loans have an adjusted R^2 value of over 0.1. Return on loans has the highest adjusted R^2 value of 0.166. The results of the model

are mostly statistically significant at the 1 % level. Out of 13 coefficients between the independent and dependent variables, nine are significant at the 1 % level and one at the 5 % level, while three are not statistically significant. The control variable “Size” (total assets in \$ billion) is the only variable with less significant results. The relative size of received TARP funds has had a mixed effect on the performance of the recipient banks compared to each other and to banks not receiving TARP funds: four of the ten statistically significant indicators seem to have been negatively affected. The effects on the indicators and their underlying factors are, however, not completely straightforward, as discussed in the next section. The implications of the model’s findings on the hypotheses of this thesis are discussed in section 5.4 in connection with interpretation of the Lagged Performance Model’s results.

5.3.1. Profitability Effect Results

The dependent variables 1, 3, 5, 6, and 7 or return on assets, loan loss provision to loans, noninterest expenses to total assets, noninterest income to total assets, and return on loans, respectively, are profitability measures. The most fundamental overall profitability measure observed in this thesis is variable 1, return on assets, as it includes all items of the profit and loss statement and the total amount of assets in the balance sheet. All of the profitability measures have statistically significant results in the model at the 1 % level for the independent variable rTARP.

The relative size of received TARP funds has had a negative effect on return on assets, loan loss provision to loans, and noninterest expenses to total assets (regression parameters -0.227, 0.627, and 0.719, respectively). All of these indicators’ results are to some extent at the discretion of the banks’ managers, meaning that the seemingly negative immediate effects can ultimately be neutral or positive. Loan loss provisions are deemed to be the most important accrual item in the banking industry and of material importance from the viewpoint of bank performance by Beatty & Liao (2014).

The most evident effect has been on noninterest expenses to total assets (coefficient 0.719), which is, for a significant part, at the discretion of the banks’ managers. This a significant impact as the standard deviation of the variable in the sample is only 2.50 %. Despite having a negative effect on the immediate profitability indicators of a bank, the increase in noninterest expenses is not necessarily a negative sign. The increase in noninterest expenses can be the

result of managers deciding to spend a normalized sustainable amount after having to spend an unsustainably small amount during the difficult quarters preceding the TARP injections, therefore indicating a positive change in the banks' performance. The second highest coefficient (0.627) of the aforementioned negatively affected indicators is for loan loss provision to loans. E.g. Harris et al. (2013) report a similar effect on their study on listed banks only. Similarly to noninterest expenses, the rise in loan loss provision to total loans in the fourth quarter after receiving the TARP funds is not necessarily an overall negative effect on the banks in the mid to long term. This is an interesting finding providing motive for further research, as even though a consistent loan loss provision model has not arisen in the accounting literature (Beatty & Liao 2014), the discovery of the effect of received TARP funds' on the managerial discretion over loan loss provisions would be highly informative. Loan loss provisions is also an item that is often subjected to management's discretion and even a predictor of positive future cash flows (Liu & Ryan 1995; Wahlen 1994).

Of the profitability indicators, TARP funds have had the least significant negative effect on return on assets (coefficient -0.227). Firstly, the decrease in return on assets can be deemed anticipated as the receipt of TARP funds increases the denominator of the return on assets formula. Secondly, the negative effect on return on assets raises a similar question of TARP funds' effect on banks' performance as does the negative effect on the aforementioned indicators. If the banks' managers have seen the TARP funds as an enabler for provisioning for loan losses and normalizing the noninterest expense levels, this would result in a reduction in return on assets without actually weakening the banks' underlying performance. In addition to the mentioned effects on the numerator of the return on assets indicator, TARP funding has also had an effect on the indicator's denominator, i.e. total assets. Receiving TARP funds increases the amount of total assets of a bank and therefore reduces the return on assets indicator, *ceteris paribus*. In addition, despite the overall credit supply was positively stimulated by TARP injections according to Li (2013), it might be that the banks have had a lag in their capability to utilize the received extra capital as efficiently as their pre-TARP capital, thus not being as profitable as prior to the capital injection.

The relative size of received TARP funds has had a positive effect on variables 6 and 7, or noninterest income to total assets and return on loans, respectively. As opposed to the indicators discussed above, that were seemingly negatively affected by the relative size of the TARP

injections, the indicators showing positive reaction to TARP are mostly not under the discretion of the banks' managers.

Relative TARP injection size has had the most evident positive effect on return on loans (coefficient 1.293). This is a very significant effect as the coefficient is high and as TARP injections were not, in general, provided for banks with a high proportion of distressed loans in their portfolios (Bayazitova & Shivdasani 2012). In addition, the standard deviation of return on loans in the sample is only 3.72 %. This effect on return on loans suggests that the relative size of received TARP funds has indeed enhanced the receiving banks' performance. The increase in return on loans while simultaneously experiencing a decrease in return on assets can indicate that the banks receiving the largest proportional amounts of TARP funds have had problems deploying the full amount of received TARP funds to profitable uses, but the amount that has been deployed has performed exceptionally well for the banks receiving the largest proportional amounts of TARP funds. In addition to return on loans, the relative size of TARP funds received has had a positive impact on noninterest income to total assets (coefficient 0.179). The increase is, however, modest and considerably smaller than the increase in noninterest expenses to total assets (coefficient 0.719), and is not therefore highly significant. The implications of the model's findings on the hypotheses of this thesis are discussed in section 5.4 in connection with interpretation of the Lagged Performance Model's results.

5.3.2. Balance Sheet Effect Results

The dependent variables 2, 4, 8, 9, 10, 11, 12, and 13 or tier I common equity ratio, nonperforming loans to total loans, real estate loans to total loans, liquidity ratio, illiquid assets to total assets, core deposits to total assets, deposit growth rate, and unused loan commitments to total loan commitments plus total assets, respectively, are balance sheet based indicators measuring the solvency and/or other financial health of the banks. Four of the eight indicators have statistically significant results in the model at the 1 % level for the independent variable. Tier I common equity ratio, deposit growth rate, and unused loan commitments to total loan commitments plus total assets do not show statistically significant results for the independent variable rTARP.

Real estate loans to total loans, liquidity ratio, illiquid assets to total assets, and core deposits to total assets all show statistically significant results for the independent variable rTARP. The

three last mentioned variables' effects are all negative, or more precisely, have contributed to making the banks' capital structures riskier (coefficients -1.185, 1.455, and -1.814, respectively). Core assets to total assets declining implies that the TARP funds have not been invested into core (i.e. the least risky) assets at as high ratio as before the TARP injections. The decline in liquidity ratio implies that the amount of cash to total assets has been decreased, making the balance sheets of the banks riskier. This might also be resultant of the proportion of investment securities increasing, which cannot be categorized as more or less risky without further information, as the investment securities with increased allocations might be less or more risky than the banks' average assets. The increase in illiquid assets to total assets is mostly analogous in nature with the decrease in liquidity ratio. The risk-increasing effect of TARP injections found in the model's results is in line with e.g. Duchin & Sosyura (2014) and Black & Hazelwood (2013) who report findings implicating that the TARP funds contribute to riskier investments made by the recipients. The coefficient of nonperforming loans to total loans (0.152) is not significant at the 5 % level, but at the 5.3 % level, i.e. the result can be deemed significant. This value also indicates a negative effect on the TARP recipients' balance sheets. Real estate loans to total loans (coefficient 1.054) has increased with the amount of TARP funds to total assets. Despite Cornett et al. (2013) finding that banks with more real estate loans in their balance sheets were more likely to repay TARP fund earlier, this effect cannot be simply categorized as a negative or positive, but more a descriptive indicator. The implications of the model's findings on the hypotheses of this thesis are discussed in the next section in connection with interpretation of the Lagged Performance Model's results.

5.4. RESULTS OF THE LAGGED PERFORMANCE EFFECT MODEL

The Lagged Performance Effect Model's sample differs from the Performance Effect Model's sample due to the addition of one variable and missing data points within it. The sample size is 2 986 compared to Performance Effect Model's 3 896. The results for the independent q_{-1} performance variable are statistically significant at the 1 % level for all variables except for deposit growth rate. The addition of the independent q_{-1} performance variable into the model increases the adjusted R^2 statistics dramatically. The adjusted R^2 values range from 0.118 to 0.794 compared to 0.009–0.166 in the Performance Effect Model for the variables that show a statistically significant result for the independent variable $rTARP$.

The estimated effects of the independent variable rTARP on the dependent variables in the Lagged Performance Effect Model is, as expected due to high similarity of samples, highly similar to that estimated by the Performance Effect Model: all dependent variables for which the first model estimated significant positive or negative effects show positive or negative effects, respectively in the second model. The added independent q_{-1} performance variable has had a more significant effect on the balance sheet based indicators than rTARP. For most of the balance sheet based indicators, the q_{-1} performance variable's regression coefficient is ca. 0.9. Unlike for the balance sheet based indicators, rTARP has had a clearly higher impact on the profitability indicators than the q_{-1} performance indicator. The q_{-1} profitability performance variables' regression coefficients' absolute values are less than 0.2 for all of the indicators. This implies a more stable behavior in the balance sheet items' development in comparison to the profit & loss statement items in reaction to received TARP funds.

In the light of these results, the hypothesis H_1 stating that the received TARP funds' relative size has an effect on the banks' performance can be accepted, but the effect is, at least seemingly, mixed. The effect could be deemed positive instead of mixed, if the TARP funds' relative size's negative effect on return on assets and loan loss provision to total loans were proven to be the result of managers' discretion. For example Bushman (2014) notes that opportunistic accounting choices might play a role in a pattern of managers' behavior, and that these choices may be made in response to increased pressure. This finding sets a basis for further research on the result planning of banks after receipt of TARP funds.

TABLE 9. RESULTS OF THE LAGGED PERFORMANCE EFFECT MODEL

The table presents the regression parameter estimates for the Lagged Performance Effect Model. rTARP is the received TARP funds' size divided by total assets. Corresponding performance indicators are the corresponding indicators at the end of the latest quarter before receiving TARP funds for the dependent variable in each regression. The control variable "Size" is measured in \$ billions. Standard errors are reported in parentheses and the adjusted R² statistic on the right hand side. The model includes 2 986 observations for each variable. Statistical significance is indicated by * and ** at the 5% and 1% levels, respectively.

Dependent variables (q4)	Independent variables		Control variables		Adj. R ²
	rTARP	Corresponding performance indicator (q-1)	BHC	Size	
(1) Return on assets	-.205** (.036)	.180** (.009)	.000 (.001)	-5.851e ⁻⁶ (.000)	.139
(2) Tier I common equity ratio	.091** (.029)	.684** (.011)	.003** (0.001)	4.537×10 ⁻⁶ (.000)	.576
(3) Loan loss provision to loans	.718** (.050)	.110** (.012)	.002 (.001)	.000** (.000)	.118
(4) Nonperforming loans to total loans	.143* (.062)	1.364** (.023)	-.003 (.002)	3.893e ⁻⁶ (.000)	.535
(5) Noninterest expenses to total assets	.841** (.039)	.101** (.009)	.003* (.001)	5.656e ^{-5**} (.000)	.162
(6) Noninterest income to total assets	.221** (.019)	.161** (.007)	.002** (.001)	4.583e ^{-5**} (.000)	.226
(7) Return on loans	1.148** (.060)	-.121** (.011)	.006** (.002)	7.873e ^{-5**} (.000)	.201
(8) Real estate loans to total loans	.091 (.065)	.936** (.005)	.000 (.002)	1.067e ⁻⁵ (.000)	.922
(9) Liquidity ratio	.184 (.097)	.875** (.009)	-.003 (.003)	2.048e ⁻⁵ (.000)	.761
(10) Illiquid assets to total assets	.236* (.097)	.846** (.011)	.002 (.003)	1.013e ⁻⁵ (.000)	.684
(11) Core deposits to total assets	-.396** (.097)	.893** (.009)	.004 (.003)	5.335e ⁻⁷ (.000)	.772
(12) Deposit growth rate	-7.973e ³ (2.934e ⁴)	.000 (.000)	-1.731e ^{3**} (.796e ³)	.120 (7.185)	.000
(13) Unused loan commitments to total loan commitments plus total assets	-.259** (.061)	1.143** (.011)	.011** (.002)	-5.122e ^{-5**} (.000)	.794

5.4.1. Profitability Effect Results

All profitability indicators – return on assets, loan loss provision to loans, noninterest expenses to total assets, noninterest income to total assets, and return on loans – show results very close

to those of the Performance Effect Model's for the independent variable rTARP, as expected due to similar samples. The independent variable rTARP has had a more significant effect on each of the profitability indicators than their respective q_{-1} performances. The significant and high positive effect of received TARP funds' relative size on return on loans supports accepting the hypothesis H_{2d} stating that the received TARP funds' relative size has had an effect on the banks' lending activities' profitability. Meanwhile, the mixed effect of received TARP contributions' relative size on the profitability of the banks supports rejecting the hypothesis H_{2c} stating that the received TARP funds' relative size has an effect on the banks' overall profitability. However, due to the possible managerial discretion over the discussed parts of the banks' profitability, rejecting or accepting this hypothesis requires further research on the subject.

5.4.2. Balance Sheet Effect Results

The q_{-1} performance has had a clear and significant effect on the q_4 balance sheet based performance of the banks in the sample. On the contrary to the profitability indicators, the q_{-1} performance has a significantly more evident effect on the independent variables than the independent variable rTARP. All of the statistically significant estimates of the balance sheet based independent performance q_{-1} variable's regression coefficients are very high, ranging from 0.684 to 1.364 (including the coefficient for liquidity ratio, which is not significant at the 5 % level, but at the 5.8 % level), whereas the respective rTARP coefficients' absolute values range from 0.091 to 0.396. These findings support accepting the main hypothesis H_1 stating that the relative size of received TARP funds has had an effect on the banks' performance. However, the effect has been mixed depending on which performance indicator is studied, and the overall performance effect is left unclear as the discretionary items' usage is not revealed by this study. The findings do not support accepting hypothesis H_{2a} nor H_{2b} stating that the relative size of received TARP funds would have an effect on the banks' solvency or risk taking, as the results show relatively small effects on the indicators and the effects are mixed in effect.

5.5. RESULTS OF THE TARP RECEIPT PROBABILITY MODEL

The TARP Receipt Probability Model's results are presented in Table 10 below. Of the 3 932 banks in the sample, 430 received TARP funds and 3 502 did not. The Cox & Snell pseudo R^2 of the model is 0.219. Five of the thirteen independent performance indicator variables show

statistically significant results at the 1 % level. The indicators with statistically significant results are tier I common equity ratio, return on loans, liquidity ratio, illiquid assets to total assets, and core deposits to total assets. Of the control variables, BHC shows a statistically significant result at the 1 % level and Size shows significant results at the 8.8 % level.

The abovementioned independent variables' statistically significant results all suggest that TARP funds were allocated for banks with weaker performance in the quarter preceding the TARP injections. The most evident effect on the likelihood of receiving TARP funds has been implied by return on loans and tier I common equity ratio. Return on loans has had the most significant effect: the likelihood of receiving TARP funds has decreased by a factor of 0.779 for a one percentage point increase in the return on loans indicator at q_{-1} . One percentage point increase in tier I common equity ratio decreased a bank's likelihood of receiving TARP funds significantly, by a factor of 0.829, which is in line with the findings of Cornett et al. (2013) using the same variables.

TABLE 10. RESULTS OF THE TARP RECEIPT PROBABILITY MODEL

The table presents the regression parameters (β) and the odds ratios (exponentiations of the regression parameters, e^β) for the TARP Recipient Probability Model. The dependent variable TARP is a dummy variable taking the value of 1 for the 430 banks in the sample that received TARP funds and the value of 0 for the 3 502 banks that did not. The independent performance indicator variables are measured at the end of the latest reported quarter before receipt of TARP funds and multiplied by 100 in order to observe 1 pp changes' effect on likelihood. The model includes 3 932 observations for each variable. Statistical significance is reported in parentheses. Statistical significance is indicated by * and ** at the 5% and 1% levels, respectively.

Independent variables ($\times 100, q_{-1}$)	TARP (dependent variable)	
	β	e^β
(1) Return on assets	.012 (.638)	1.012 (.638)
(2) Tier I common equity ratio	-.188** (.000)	0.829** (.000)
(3) Loan loss provision to loans	-.001 (.948)	.999 (.948)
(4) Nonperforming loans to total loans	-.022 (.390)	.978 (.390)
(5) Noninterest expenses to total assets	-.012 (.600)	.988 (.600)
(6) Noninterest income to total assets	.033 (.251)	1.034 (.251)
(7) Return on loans	-.249** (.000)	0.779** (.000)
(8) Real estate loans to total loans	-.003 (.591)	.997 (.591)
(9) Liquidity ratio	-.033** (.000)	.968** (.000)
(10) Illiquid assets to total assets	.028** (.006)	1.029** (.006)
(11) Core deposits to total assets	-.031** (.000)	.969** (.000)
(12) Deposit growth rate	.000 (.727)	1.000 (.727)
(13) Unused loan commitments to total loan commitments plus total assets	-.012 (.583)	.988 (.583)
Control variables		
BHC	.647** (.001)	1.910** (.001)
Size (Total assets \$ billion)	.048 (.088)	1.050 (.088)

The independent variables liquidity ratio, illiquid assets to total assets, and core deposits to total assets all show a smaller effect on the likelihood of receiving TARP capital. The odds ratios for these independent variables are 0.968, 1.029, and 0.969, respectively. The finding regarding core deposits to total assets supports Cornett et al. (2013), who also find a higher core deposits to total assets value having a statistically significant negative effect on probabilities of receiving TARP funds.

Even though the effects of the aforementioned variables' values on the likelihood of receiving TARP capital are significantly smaller than those of tier I common equity ratio's and return on loans', they are still significant as the standard deviations of these variables are between 14 % and 17 % in the base data. These findings would support answering the main research question with an affirmative, i.e. stating that a fair and optimal distribution of the TARP capital has been conducted.

In addition to the independent variables' effects, the control variables have had a statistically significant effect on the likelihood of receiving TARP funds. If a bank is part of a BHC structure, it has been 1.910 times more likely to receive TARP funding. This is a highly significant result in the statistical sense, being significant at less than the 1 % level. However, the relevance of the finding is miniscule, as under 30 % of the banks in the samples are not part of a BHC structure and the non-BHC banks are on average very small compared to BHC banks. Furthermore, regarding the bank size's effect on the receipt probability, a \$1 billion increase in bank's total assets has increased the likelihood of receiving TARP capital by a factor of 1.050, i.e. the larger the bank, the higher its probability for receiving a TARP injection. This is in line with an earlier study by Cornett et al. (2013), who find that banks with \$500 million or more in total assets were more likely to receive TARP funds than banks with less than \$500 million in total assets.

Even though the TARP Receipt Probability Model presented above does not yield statistically significant results for eight out of the thirteen dependent variables, the findings of the TARP Receipt Probability Model are interpreted to support acceptance of hypothesis H₃ through the most relevant findings of the results. This is due to finding that the banks with a lower tier I common equity ratio and/or lower return on loans have clearly been more likely to receive TARP funds.

6. CONCLUSIONS

This section concludes the literature review and empirical study conducted in this thesis. The conclusions are presented from the viewpoint of the research question and hypotheses. In addition to conclusions, the observed limitations of this thesis are also briefly discussed. Lastly, this section presents suggestions for further research.

6.1. CONCLUSIONS ON TARP'S OPTIMAL AND FAIR ALLOCATION

In this thesis, TARP funds' effect on banks' performance is studied by reviewing prior literature and by conducting an empirical study utilizing the regression models presented earlier. The main research question of this thesis is "Were the TARP funds allocated optimally and fairly among the U.S. banking industry's entities?". The main research question cannot be unequivocally answered through the study conducted as the results of the empirical study yield contradictory results.

However, some of the performance indicators are seemingly negatively affected by the size of received TARP funds, relative to the recipient's size, and some are seemingly positively affected. This mixed effect of TARP on the whole bank sample would suggest that the funds were not allocated unfairly, as no direct causality between TARP and higher or lower performance is detected. As depicted in the next section, the results of this study still leave open the possibility that the relative size of received TARP funds did, in fact, provide its recipient with an unfair advantage, if the seemingly negative effects are accountable for discretionary items.

6.2. CONCLUSIONS ON TARP'S EFFECT ON PERFORMANCE

Earlier literature has found that receiving TARP funds has had a negative effect on a banks efficiency while not increasing the amount of lending, TARP has induced moral hazard, and that TARP funds were high-cost capital for the receiving banks. On the contrary, earlier studies also state that TARP recipients received competitive advantage, increased their market share, and increased their market power. The findings of earlier literature are, hence, mixed on the subject of TARP's effect on banks' overall performance.

This study's findings support accepting the main hypothesis H_1 stating that the relative size of received TARP funds has had an effect on the banks' performance. However, the models estimated in this thesis provide results with mixed effects on the performance indicators, depending on which performance indicator is studied. The overall performance effect is left unclear as the discretionary items' usage is not revealed by this study. For example, the relative size of received TARP funds has had a negative effect on return on assets, loan loss provision to loans, and noninterest expenses to total assets, but the relative size of received TARP funds has had a positive effect on noninterest income to total assets and return on loans. Furthermore, the effect of managers' discretion over these indicators is not known.

The findings of this study do not unanimously support accepting or rejecting hypothesis H_{2a} nor H_{2b} stating that the relative size of received TARP funds would have an effect on the banks' solvency or risk taking, as the results show relatively small effects on the indicators and the effects are mixed in effect. Liquidity ratio, illiquid assets to total assets, nonperforming loans to total loans, and core deposits to total assets are all showing negative results, or more precisely, have contributed to making the banks' capital structures riskier. On the other hand, in the Lagged Performance Effect Model, the tier I common equity ratio shows a statistically significant positive reaction for received TARP funds. The acceptance of H_{2a} or H_{2b} based on these results alone would be precipitate, as many of the indicators are, for a large part, subject to managers' discretion.

Meanwhile, the mixed effect of received TARP contributions' relative size on the profitability of the banks supports rejecting the hypothesis H_{2c} stating that the received TARP funds' relative size has an effect on the banks' overall profitability. However, due to the possible managerial discretion over the discussed parts of the banks' profitability, rejecting or accepting this hypothesis requires further research on the subject. The significant and high positive effect of received TARP funds' relative size on return on loans supports accepting the hypothesis H_{2d} stating that the received TARP funds' relative size has had an effect on the banks' lending activities' profitability.

The results of the TARP Receipt Probability Model implicate that banks with weaker balance sheets and poorer profitability have been more likely to receive TARP capital injections, which in its part suggests that the TARP injections have been invested fairly among the potential recipients. This is also supported by earlier studies finding that healthier banks were more likely

to reject TARP funding. This result allows the acceptance of H_3 , which states that “The banks’ prior performance has an effect on the banks’ probability to receive TARP funds”.

Despite the hypothesis H_1 being concluded with mixed effects, and hypotheses H_{2a} , H_{2b} , and H_{2c} being left without an undisputed conclusion, this study does find that banks receiving TARP funds have, before TARP, had smaller returns on loans and less tier I common equity compared to their total assets. It is interesting to note that the rise in relative amount of TARP funds received has not increased the banks’ tier I common equity ratios very notably (though they have increased), but the return on loans has experienced a significant surge. This is, even though the clearest measured factor affecting the probability to receive TARP funds has been precisely return on loans. If the negative effects of TARP receipt found in this study are indeed the result of managements’ discretion over certain items, it would suggest a significant positive overall reaction for receipt of TARP funds as the positively reacted return on loans is one of the least discretionary indicators analyzed in this study.

6.3. TOPICS FOR FURTHER RESEARCH

Despite the main research question left being only partly answered, this thesis provides information complementing the earlier literature and a basis for further research on various topics. For example, as this thesis assumes that the “TARP trigger” for non-TARP banks is the average date of TARP receipts, the results may suffer from the effect of selection bias. One way to further research the topic would be to select more randomly timed samples of non-TARP banks corresponding each TARP bank in the sample. Another topic for further research is the extreme variance of some of the performance indicators studied in this thesis.

As this thesis studies only the effect of relative size of received TARP funds after one year after receipt, another interesting research topic is the longer-term effect. The effect of relative size of received TARP funds could be visible more clearly after e.g. two or three years after the TARP injections and/or with cumulated performance indicators. A study concentrating on performance indicators two or three years from the TARP injection could also shed light on the matter of discretionary items as the “true” effects of the TARP injections could then possibly be better visible if the effect of the potential managers’ result manipulation would already have faded. However, when studying the longer-term effects, the utilization of profits generated by the TARP injections’ capital would have to be taken into consideration.

The most pressing topic for further research stemming from this thesis is, however, the usage of discretionary items by the banks' managers around the receipt of TARP funds. The evident contradiction in the effect of relative size of received TARP funds on return on assets and on return on loans is an interesting finding. Return on assets' is calculated using net profit after taxes, which includes all profit & loss statements items, and therefore is potentially highly dependent on the items that are under bank managers' discretion. One interesting topic for further research is that is there evidence of unusual usage of discretionary items in U.S. banks around the TARP program and which discretionary items have been most used to steer the results. The finding that return on loans has been positively affected also leaves open the question whether the relative size of received TARP funds has indeed had a positive effect on the recipients' performance, as would be expectable referring to the earlier studies finding that TARP recipients gained market power, market size and competitive advantage. An interesting question arises from these findings: Did U.S. banks accumulate writedown backlogs before the initiation of TARP, and did these banks use the TARP proceeds to unravel this backlog?

REFERENCES

- Akins, B., Li, L., Ng, J. & Rusticus, T. O., 2016. Bank Competition and Financial Stability: Evidence from the Financial Crisis. *Journal of Financial and Quantitative Analysis*, 51(1), pp.1–28.
- Ball, R. & Brown, P., 1968. An Empirical Evaluation of Accounting Income Numbers. *Journal of Accounting Research*, 6(2), pp.159–178.
- Barth, J.R., Caprio, G. & Levine, R., 2004. Bank regulation and supervision: What works best? *Journal of Financial Intermediation*, 13(2), pp.205–248.
- Barth, M.E. & Landsman, W.R., 2010. How did Financial Reporting Contribute to the Financial Crisis? *European Accounting Review*, 19(3), pp.399–423.
- Basel Committee on Banking Supervision, 2011. Basel III: A global regulatory framework for more resilient banks and banking systems. Available at: <http://www.bis.org/publ/bcbs189.pdf>
- Bayazitova, D. & Shivdasani, A., 2012. Assessing TARP. *Review of Financial Studies*, 25(2), pp.377–407.
- Beatty, A. & Liao, S., 2011. Regulatory Capital Ratios, Loan Loss Provisioning and Pro-Cyclicality. *Journal of Accounting and Economics*, 52, pp.1–20.
- Beatty, A. & Liao, S., 2014. Financial accounting in the banking industry: A review of the empirical literature. *Journal of Accounting and Economics*, 58(2–3), pp.339–383.
- Berger, A.N. & Roman, R.A., 2015. Did TARP Banks Get Competitive Advantages? *Journal of Financial and Quantitative Analysis*, 50(6), pp.1199–1236.
- Black, L.K. & Hazelwood, L.N., 2013. The effect of TARP on bank risk-taking. *Journal of Financial Stability*, 9(4), pp.790–803.
- Blackwell, D.W., Brickley, J.A. & Weisback, M.S., 1994. Accounting information and internal performance evaluation. Evidence from Texas banks. *Journal of Accounting and Economics*, 17(3), pp.331–358.
- Bond, P. & Goldstein, I., 2015. Government Intervention and Information Aggregation by Prices. *The Journal of Finance*, 70(6), pp.2777–2812.
- Bonin, J.P., Hasan, I. & Wachtel, P., 2005. Bank performance, efficiency and ownership in transition countries. *Journal of Banking and Finance*, 29, pp.31–53.
- Boyd, J.H. & Heitz, A., 2016. The social costs and benefits of too-big-to-fail banks: A “bounding” exercise. *Journal of Banking and Finance*, 68, pp.251–265.

- Bushman, R.M., 2014. Thoughts on financial accounting and the banking industry. *Journal of Accounting and Economics*, 58(2–3), pp.384–395.
- Bushman, R.M. & Williams, C.D., 2015. Delayed Expected Loss Recognition and the Risk Profile of Banks. *Journal of Accounting Research*, 53(3), pp.511–553.
- Calomiris, C.W. & Khan, U., 2015. An Assessment of TARP Assistance to Financial Institutions. *Journal of Economic Perspectives*, 29(2), pp.53–80.
- Cordella, T. & Yeyati, E.L., 2003. Bank bailouts: Moral hazard vs. value effect. *Journal of Financial Intermediation*, 12(4), pp.300–330.
- Cornett, M.M., Li, L. & Tehranian, H., 2013. The performance of banks around the receipt and repayment of TARP funds: Over-achievers versus under-achievers. *Journal of Banking and Finance*, 37(3), pp.730–746.
- Dam, L. & Koetter, M., 2012. Bank bailouts and moral hazard: Evidence from Germany. *Review of Financial Studies*, 25(8), pp.2343–2380.
- Ding, C.G., Wu, C.-H. & Chang, P.-L., 2013. The influence of government intervention on the trajectory of bank performance during the global financial crisis: A comparative study among Asian economies. *Journal of Financial Stability*, 9(4), pp.556–564.
- Duchin, R. & Sosyura, D., 2014. Safer ratios, riskier portfolios: Banks' response to government aid. *Journal of Financial Economics*, 113(1), pp.1–28.
- Ehrenberg, R.G. & Oaxaca, R.L., 1976. Unemployment Insurance, Duration of Unemployment, and Subsequent Wage Gain. *American Economic Review*, 66(5), pp.754–766.
- Fahlenbrach, R., Prilmeier, R. & Stulz, R.M., 2012. This time is the same: Using the events of 1998 to explain bank returns during the financial crisis. *The Journal of Finance*, 67(6), pp.2139–2178.
- Farruggio, C., Michalak, T.C. & Uhde, A., 2013. The light and dark side of TARP. *Journal of Banking and Finance*, 37(7), pp.2586–2604.
- Granja, J., 2013. The relation between bank resolutions and information environment: Evidence from the auctions for failed banks. *Journal of Accounting Research*, 51(5), pp.1031–1070.
- Gropp, R., Hakenes, H. & Schnabel, I., 2011. Competition, risk-shifting, and public bail-out policies. *Review of Financial Studies*, 24(6), pp.2084–2120.
- Harris, O., Huerta, D. & Ngo, T., 2013. The impact of TARP on bank efficiency. *Journal of International Financial Markets, Institutions and Money*, 24(1), pp.85–104.

- Holod, D. & Lewis, H.F., 2011. Resolving the deposit dilemma: A new DEA bank efficiency model. *Journal of Banking and Finance*, 35(11), pp.2801–2810.
- Hoque, H., 2013. From the credit crisis to the sovereign debt crisis: Determinants of share price performance of global banks. *International Review of Financial Analysis*, 30, pp.334–350.
- Hoshi, T. & Kashyap, A.K., 2010. Will the U.S. bank recapitalization succeed? Eight lessons from Japan. *Journal of Financial Economics*, 97(3), pp.398–417.
- House, C.L. & Masatlioglu, Y., 2015. Managing markets for toxic assets. *Journal of Monetary Economics*, 70, pp.84–99.
- Houston, J.F., James, C.M. & Marcus, D., 1997. Capital Market Frictions and the Role of Internal Capital Markets in Banking. *Journal of Financial Economics*, 46(2), pp.135–164.
- Hryckiewicz, A., 2014. What do we know about the impact of government interventions in the banking sector? An assessment of various bailout programs on bank behavior. *Journal of Banking and Finance*, 46(1), pp.246–265.
- Ivashina, V. & Scharfstein, D., 2010. Bank lending during the financial crisis of 2008. *Journal of Financial Economics*, 97(3), pp.319–338.
- James, C., 1991. The Losses Realized in Bank Failures. *The Journal of Finance*, 46(4), pp.1223–1242.
- Kashyap, A.K., Rajan, R. & Stein, J.C., 2002. Banks as Liquidity Providers: An Explanation for the Coexistence of Lending and Deposit-Taking. *The Journal of Finance*, 57(1), pp.33–73.
- Khan, M. & Vyas, D., 2015. The Capital Purchase Program and subsequent bank SEOs. *Journal of Financial Stability*, 18, pp.91–105.
- Kim, D.H. & Stock, D., 2012. Impact of the TARP financing choice on existing preferred stock. *Journal of Corporate Finance*, 18(5), pp.1121–1142.
- Larcker, D.F. & Rusticus, T.O., 2010. On the use of instrumental variables in accounting research. *Journal of Accounting and Economics*, 49(3), pp.186–205.
- Li, L., 2013. TARP funds distribution and bank loan supply. *Journal of Banking and Finance*, 37(12), pp.4777–4792.
- Lin, X. & Zhang, Y., 2009. Bank ownership reform and bank performance in China. *Journal of Banking and Finance*, 33(1), pp.20–29.

- Liu, C.-C. & Ryan, S.G., 1995. The Effect of Bank Loan Portfolio Composition on the Market Reaction to and Anticipation of Loan Loss Provisions. *Journal of Accounting Research*, 33(1), pp.77–94.
- Liu, W., Kolari, J. W., Tippens, T. K. & Fraser, D. R., 2013. Did capital infusions enhance bank recovery from the great recession? *Journal of Banking and Finance*, 37(12), pp.5048–5061.
- Logue, D.E. & Rivoli, P., 1992. Some Consequences of Banks' LDC Loans: A Note. *Journal of Financial Services Research*, 47(6), pp.37–47.
- Markowitz, H., 1952. Portfolio selection. *The Journal of Finance*, 7(1), pp.77–91.
- Mortensen, D., 1977. Unemployment Insurance and Job Search Decisions. *Industrial and Labor Relations Review*, 30(4), pp.505–517.
- Nakashima, K., 2016. An econometric evaluation of bank recapitalization programs with bank- and loan-level data. *Journal of Banking and Finance*, 63, pp.1–24.
- O'Hara, M. & Shaw, W., 1990. Deposit Insurance and Wealth Effects: The Value of Being “Too Big to Fail” *The Journal of Finance*, 45(5), pp.1587–1601.
- Philippon, T. & Schnabl, P., 2013. Efficient Recapitalization. *The Journal of Finance*, 68(1), pp.1–42.
- Pigou, A.C., 1951. Some Aspects of Welfare Economics. *American Economic Review*, 41(3), pp.287–315.
- Public Law 110–343, div. A, § 2, Oct. 3, 2008, 122 Stat. 3766. Available at: <https://www.law.cornell.edu/uscode/text/12/5201>
- Sharpe, W.F., 1966. Mutual Fund Performance. *Journal of Business*, 39, pp.119–138.
- U.S. Department of the Treasury, 2010. Troubled Asset Relief Program: Two Year Retrospective. Available at: https://www.treasury.gov/initiatives/financial-stability/reports/Documents/TARP%20Two%20Year%20Retrospective_10%2005%2010_transmittal%20letter.pdf
- U.S. Department of the Treasury, 2013. Troubled Asset Relief Program, Four Year Retrospective Report. Available at: <https://www.treasury.gov/initiatives/financial-stability/reports/Documents/TARP%20Four%20Year%20Retrospective%20Report.pdf>
- U.S. Department of the Treasury, 2016a. Troubled Asset Relief Program, Monthly Report to Congress, February 2016. Available at: <https://www.treasury.gov/initiatives/financial-stability/reports/Documents/2016.02%20February%20Monthly%20Report%20to%20Congress.pdf>

U.S. Department of the Treasury, 2016b. TARP Transaction Report – Investments. Available at: https://www.treasury.gov/initiatives/financial-stability/reports/Documents/01-2916%20Transactions%20Report%20as%20of%2001-27-16_INVESTMENT_ConvenienceCopy.xlsx

Wahlen, J.M., 1994. The Nature of Information in Commercial Bank Loan Loss Disclosures. *Accounting Review*, 69(3), pp.455–478.

Veronesi, P. & Zingales, L., 2010. Paulson's gift. *Journal of Financial Economics*, 97(3), pp.339–368.

APPENDIX 1: DESCRIPTIONS OF CALL REPORT CODES USED

Call Report Code	Description
RSSD ID	RSSD ID of Reporting Entity
NM_SHORT	Name Short
RCON9999	Date of Report
REG_HH_1_ID	Regulatory High Holder
RIAD4107	Total Interest Income
RCFD2170	Total Assets
RIAD4010	Interest and Fee Income on Loans, Total
RIAD4079	Total Noninterest Income
RIAD4093	Total Noninterest Expense
RIAD4230	Provision for Loan and Lease Losses
RIAD4340	Net Income (Loss)
RCFD8274	Tier 1 Capital Allowable Under the Risk-Based Capital Guidelines
RCFD1410	Loans Secured by Real Estate
RCFD2122	Total Loans and Leases, Net of Unearned Income
RCFD2123	Unearned Income on Loans
RCON2215	Total Transaction Accounts
RCFD1403	Total Loans and Lease Finance Receivables: Nonaccrual
RCFDG301	Mortgage-Backed Securities (MBS): Residential Pass-Through Securities: Guaranteed by GNMA: Held-to-Maturity Fair Value
RCFDG303	Mortgage-Backed Securities (MBS): Residential Pass-Through Securities: Guaranteed by GNMA: Available-for-Sale Fair Value
RCFDG305	Mortgage-Backed Securities (MBS): Residential Pass-Through Securities: Issued by FNMA and FHLMC: Held-to-Maturity Fair Value
RCFDG307	Mortgage-Backed Securities (MBS): Residential Pass-Through Securities: Issued by FNMA and FHLMC: Available-for-Sale Fair Value
RCFDG309	Mortgage-Backed Securities (MBS): Residential Pass-Through Securities: Other Pass-Through Securities: Held-to-Maturity Fair Value
RCFDG311	Mortgage-Backed Securities (MBS): Residential Pass-Through Securities: Other Pass-Through Securities: Available-for-Sale Fair Value
RCFDG313	Mortgage-Backed Securities (MBS): Other Residential MBS (Include CMOS, REMICS, and Stripped MBS): Issued or Guaranteed by FNMA, FHLMC, or GNMA - Held-to-Maturity Fair Value
RCFDG315	Mortgage-Backed Securities (MBS): Other Residential MBS (Include CMOS, REMICS, and Stripped MBS): Issued or Guaranteed by FNMA, FHLMC, or GNMA - Available-for-Sale Fair Value
RCFDG317	Mortgage-Backed Securities (MBS): Other Residential MBS (Include CMOS, REMICS, and Stripped MBS): Collateralized by MBS Issued or Guaranteed by FNMA, FHLMC, or GNMA - Held-to-Maturity Fair Value
RCFDG319	Mortgage-Backed Securities (MBS): Other Residential MBS (Include CMOS, REMICS, and Stripped MBS): Collateralized by MBS Issued or Guaranteed by FNMA, FHLMC, or GNMA - Available-for-Sale Fair Value

Call Report Code	Description
RCFDG321	Mortgage-Backed Securities (MBS): Other Residential MBS (Include CMOS, REMICS, and Stripped MBS): All Other Residential MBS - Held-to-Maturity Fair Value
RCFDG323	Mortgage-Backed Securities (MBS): Other Residential MBS (Include CMOS, REMICS, and Stripped MBS): All Other Residential MBS - Available-for-Sale Fair Value
RCFD2150	Other Real Estate Owned
RCFD8509	Fair Value of Held-to-Maturity Mortgage-Backed Securities (MBS), Total
RCFD8511	Fair Value of Available-for-Sale Mortgage Backed Securities (MBS), Total
RCFDC027	Total (Asset-Backed Securities) Fair Value - Available-for-Sale
RCFDC988	Asset-Backed Securities: Held-to-Maturity-Fair Value
RCFDF639	Loans Measured at Fair Value That Are Past Due by 90 Days or More: Fair Value
RCON3814	Unused Commitments - Revolving, Open-End Lines Secured by 1-4 Family Residential Properties
RCON3815	Unused Commitments - Credit Card Lines
RCON3817	Unused Commitments - Securities Underwriting
RCON6550	Commercial Real Estate, Construction, and Land Development: Commitments to Fund Loans Not Secured by Real Estate
RCON6648	Total Time Deposits of Less Than \$100,000
RCONF164	1-4 Family Residential Construction Loan Commitments
RCONF165	Commercial Real Estate, Other Construction Loan and Land Development Loan Commitments
RCONJ457	Other Unused Commitments: Commercial and Industrial Loans
RCONJ458	Other Unused Commitments: Loans to Financial Institutions
RCONJ459	Other Unused Commitments: All Other Unused Commitments
RCFD0071	Interest-Bearing Balances
RCFD0081	Noninterest-Bearing Balances and Currency and Coin
RCFD1754	Held-to-Maturity Securities, Total
RCFD1773	Available-for-Sale Securities, Total